

Workshop Manual

Octavia II 2004 ➤

Octavia II 2010 ➤

2.0/100; 103 kW TDI PD Engine

Engine ID	BKD	AZV	BMM						
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Edition 01.2018

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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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00 – Technical data

1 Technical data

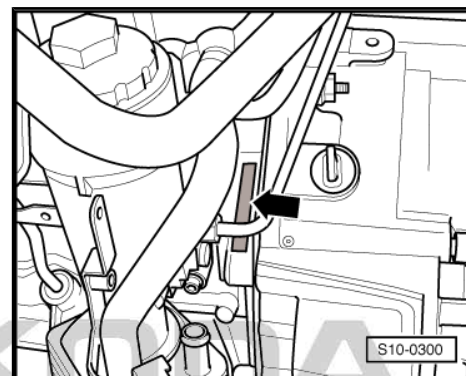
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1.1 Engine number

The engine number (“engine identification characters” and “serial number”) is located at the front at the engine/gearbox joint -arrow-.

In addition, a sticker with the “engine identification characters” and “serial number” is attached to the timing belt guard.

The engine identification characters are also indicated on the vehicle data sticker.



1.2 Engine characteristics

Engine codes	BKD	AZV	BMM
Manufactured	05:04 ➤	10:04 ➤	12:05 ➤
Emission standards conforming to	EU4	EU4	EU4
Displacement l	1.968	1.968	1.968
Output kW at rpm	103/4000	100/4000	103/4000
Torque Nm at rpm	320/1750 - 2500	320/1750 - 2500	320/1750 - 2500
Bore Ø mm	81.0	81.0	81.0
Stroke mm	95.5	95.5	95.5
Number of valves per cylinder	4	4	2
Compression ratio	18.5 : 1	18.5 : 1	18.5 : 1
Firing order	1-3-4-2	1-3-4-2	1-3-4-2
Catalytic converter	yes	yes	yes
Exhaust gas recirculation with radiator	yes	yes	yes
Turbocharging	yes	yes	yes
Charge air cooler	yes	yes	yes
Diesel particle filter	no	no	yes

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01 – Self-diagnosis

1 Self diagnosis, safety measures, cleanliness regulations and directions

1.1 Self-diagnosis

This Rep.-Gr. is deleted.

For this use the "Vehicle self-diagnosis", "Measuring method" and "Fault finding" ⇒ Vehicle diagnostic tester.

1.2 Additional instructions when undertaking assembly work on the air-conditioning system



WARNING

Do not open the refrigerant circuit of the air conditioning system.



Note

To avoid causing damage to the condenser and to the refrigerant lines and hoses make sure the lines and hoses are not over-extended, kinked or bent.

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Steps which should be taken in order to remove and install the engine without opening the refrigerant circuit:

- Unscrew the retaining clip(s) on the refrigerant lines.
- Remove V-ribbed belt ⇒ [page 23](#) .
- Remove AC compressor from the bracket for auxiliary units
⇒ [page 23](#) .
- Mount the air conditioning compressor and the condenser in such a way that the refrigerant lines/hoses are not under tension.

1.3 Safety precautions when working on fuel supply system



WARNING

- ◆ *On vehicles with engine with unit injectors, the temperature of the fuel lines or of the fuel can be up to 100 °C in an extreme case. Let the fuel cool down before opening the lines, as otherwise there is a high risk of burning.*
- ◆ *The fuel system is under pressure!*
- ◆ *Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel.*
- ◆ *Place cleaning cloths around the connection point before detaching cable connections. Reduce pressure by carefully removing the wiring.*

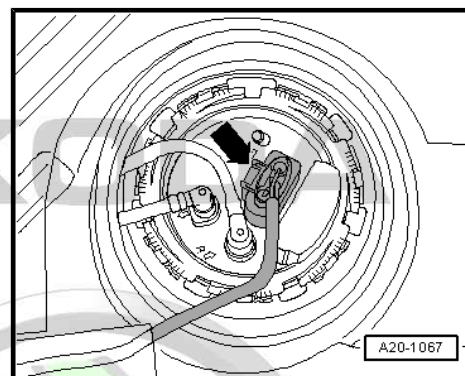
- ◆ Fuel pump is activated by switching on ignition and via driver door contact switch. Before opening the fuel system and for reasons of safety, if the battery is not disconnected, the connector -arrow- must be disconnected from the fuel delivery unit.



WARNING

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *Ensure that there is adequate free access to all moving or hot components.*



When removing and installing the fuel gauge sender from a full or partly filled fuel tank, pay attention to the following:

- ◆ The extraction hose of an exhaust extraction system which is switched on, must be positioned close to the assembly opening of the fuel tank in order to extract the released fuel vapours, even before the work is commenced. If no exhaust extraction system is available, a radial fan (motor not in air flow of fan) with a delivery volume of more than 15 m³/h must be used.
- ◆ Prevent skin contact with fuel! Wear fuel-resistant gloves!

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1.4 Safety precautions when working on the diesel direct injection system

Note the following if testers and measuring instruments have to be used during a road test:

- ◆ Always secure the test and measuring devices on the rear seat and have a second person operate them there.

If the test and measuring devices are operated from the passenger seat, the passenger could be injured by the release of the passenger airbag in the event of an accident.



WARNING

Secure the test and measuring devices to the rear seat and operate from that position.

Observe the following points to prevent injury to persons and/or damage to the injection and preheating system:

- ◆ Ignition must be switched off before disconnecting and re-connecting the wires of the injection and preheating system as well as of the test equipment.
- ◆ If the engine should be run at the starter speed without it actually igniting, then separate the central plug connection for the unit injector at the cylinder head.
- ◆ Before disconnecting the battery determine the code of the radio fitted with anti-theft coding.
- ◆ Switch off the ignition before connecting or disconnecting the battery as this could otherwise damage the diesel direct injection system control unit.
- ◆ When disconnecting and reconnecting the battery, carry out additional operations ⇒ Electrical System ⇒ Rep. gr. 27 .

1.5 Regulations concerning cleanliness when working on the fuel supply/fuel injection system

When working on the fuel supply and injection system, pay careful attention to the following "6 rules" for cleanliness:

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover. Use lint-free cloths!
- ◆ Carefully cover or close opened components if the repair is not completed immediately.
- ◆ Only install clean parts: remove spare parts from their wrapping immediately before fitting. Do not use any parts which have been stored unwrapped (e.g. on a shelf or in a tool box).
- ◆ When the system is opened: Avoid using compressed air. Avoid moving the vehicle.
- ◆ Also make sure no diesel fuel runs onto the coolant hoses. If this is the case clean the hoses immediately. Replace immediately any hoses which have suffered damage.

1.6 Regulations concerning cleanliness when working on the exhaust gas turbocharger

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Carefully observe the following "5 rules" for cleanliness when working on the exhaust gas turbocharger:

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover. Use lint-free cloths!
- ◆ Carefully cover or close opened components if the repair is not completed immediately.

- ◆ Only install clean parts: remove spare parts from their wrapping immediately before fitting. Do not use any parts which have been stored unwrapped (e.g. on a shelf or in a tool box).
- ◆ When the system is opened: Avoid using compressed air. Avoid moving the vehicle.

1.7 General instructions for charge air system



WARNING

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.
- ◆ Ensure that there is adequate free access to all moving or hot components.



Caution

In case a mechanical damage to the exhaust gas turbocharger is found, e.g. damage to the compressor wheel, it is not sufficient to only replace the turbocharger. In order to avoid consequential damage, the following tasks must be performed:

- ◆ Clean all oil lines.
- ◆ Change engine oil and oil filter.
- ◆ Check air filter housing, air filter element and charge air pipes as well as charge air hoses for soiling.
- ◆ Check all the air guides and the charge air cooler for foreign bodies.

If foreign bodies are detected in the charge air system, the complete charge-air routing must be cleaned and if necessary the charge air cooler must also be replaced.

- ◆ The charge-air system must be tight, check ➔ [page 199](#) .
- ◆ Replace self-locking nuts.
- ◆ Hose connections and hoses for the charge air system must be free of oil and grease before being installed. Only seals and sealing surfaces of the quick couplings are coated with oil ➔ [page 198](#) .
- ◆ Observe markings on the hoses and components.
- ◆ All hose connections of the charge air system are secured with spring strap clamps or push-fit couplings.
- ◆ Only install approved clamps for securing the hose connections ➔ Electronic Catalogue of Original Parts .
- ◆ Spring-type clip pliers are recommended for installation of spring-type clips.
- ◆ Assembly of hose connections with push-fit couplings ➔ [page 198](#) .



- ◆ Before screwing down the oil feed line, fill the exhaust turbo-charger via the connection fitting with engine oil.
- ◆ To ensure the oil supply to the exhaust gas turbocharger, leave the engine running for about 1 minute after installing the exhaust gas turbocharger.

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10 – Removing and installing engine

1 Removing and installing engine

1.1 Removing engine

Special tools and workshop equipment required

- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Engine/gearbox jack , e.g. - V.A.G 1383 A-
- ◆ Engine mount - T10012-
- ◆ Workshop crane , e.g. -VAS 6100-
- ◆ Double ladder , e.g. -VAS 5085 -
- ◆ Hose clamps up to Ø 25 mm - MP7-602 (3094) -
- ◆ Pliers for spring-type clips
- Enquire the event memories of all control units prior to engine removal ⇒ Vehicle diagnostic tester.



Note

- ◆ *The engine is removed downwards together with the gearbox.*
- ◆ *All cable straps that have been loosened or cut open when the engine was removed must be attached again in the same location when the engine is installed again.*
- ◆ *Leave the ignition key in the ignition lock so that the steering lock does not click into place.*
- ◆ *Collect drained coolant in a clean container for reuse or proper disposal.*



Caution

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ ***Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.***
- ◆ ***To avoid damage to lines/wiring, ensure sufficient clearance to all moving or hot components.***

Observe all safety measures and notes for assembly work on the fuel supply and injection system, at the charge air system and observe as well the rules for cleanliness ⇒ [page 2](#) .

- Remove engine cover ⇒ [page 13](#) .
- Before disconnecting the battery, if necessary remove the adapter for the anti-theft wheel bolts from the luggage compartment.

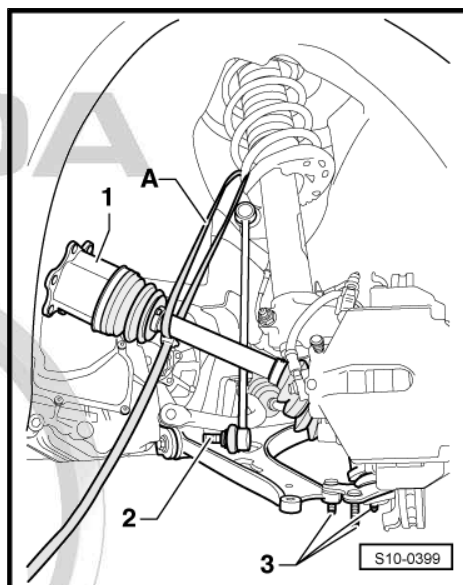
**WARNING**

*Observe necessary measures when disconnecting the battery
⇒ **Electrical System** ⇒ Rep. gr. 27 .*

- Disconnect the battery-earth strap with the ignition off ⇒ **Electrical System** ⇒ Rep. gr. 27 .
- Remove plenum chamber cover and bulkhead plenum chamber ⇒ **Body Work** ⇒ Rep. gr. 66 .
- Remove air filter with air mass meter, air intake hose and suction hose.
- ◆ Vehicles with engine code BKD, AZV: ⇒ [page 208](#)
- ◆ Engine code BMM: ⇒ [page 220](#)
- Remove battery and battery tray ⇒ **Electrical System** ⇒ Rep. gr. 27 .
- Slacken the screw for the front right drive shaft only by maximum 90°, otherwise the wheel bearing may be damaged.
- Remove both front wheels ⇒ **Chassis** ⇒ Rep. gr. 44 .
- Remove noise insulation ⇒ **Body Work** ⇒ Rep. gr. 50 .
- Remove bottom part of right wheelhouse liner ⇒ **Body Work** ⇒ Rep. gr. 66 .
- Remove right drive shaft ⇒ **Chassis** ⇒ Rep. gr. 40 .
- Unscrew left drive shaft from gearbox flange.
- Unscrew the nut from the left coupling rod -2- and press off the coupling rod from the anti-roll bar.
- Unscrew the nuts from the left steering joint -3- and press the steering joint out of the suspension arm.
- If present, unscrew coupling rod from front left vehicle level sensor - G78- .
- Turn the steering to full left lock.
- Swivel the steering joint outwards and secure the drive shaft -1- with a band -A- in the wheelhouse.
- Insert a pin screw in the suspension arm in order to stabilize the steering joint.

**WARNING**

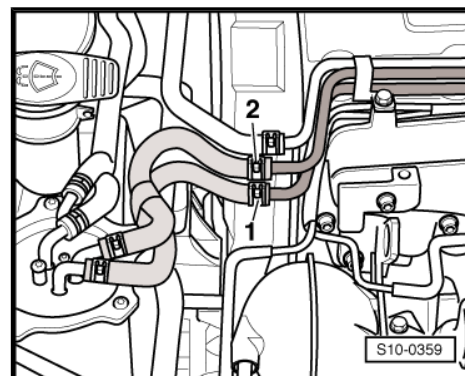
When opening the coolant expansion reservoir, hot steam or hot coolant may escape. Cover the cap with a cloth and open carefully.



- Drain coolant
- ◆ Vehicles with engine code BKD, AZV: ⇒ [page 135](#)
- ◆ Engine code BMM: ⇒ [page 143](#)

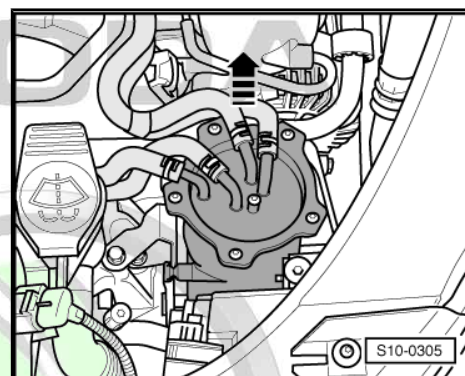
- Detach coolant hose, fuel intake hose -2- and fuel return-flow hose -1- from pipes at cylinder head.

Vehicles up to 08.05



- Unlatch fuse, remove fuel filter upwards from bracket -arrow- with its connected lines, and place to the side.

Vehicles as of 08.05



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- Release screw -1- by one turn.
- Release screw -2- and nut -3-.
- Take out fuel filter with connected hoses and lay to the side.

Continued for all vehicles

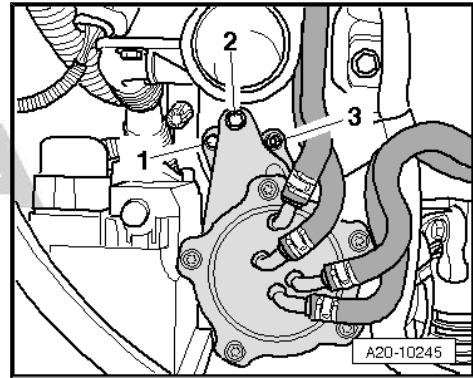
- Remove V-ribbed belt ➔ [page 23](#) .
- Remove alternator ➔ Electrical System ➔ Rep. gr. 27 .

Vehicles with air conditioning



WARNING

Do not open the refrigerant circuit of the air conditioning system.



Note

In order to avoid damage to the AC compressor as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

- Remove AC compressor from the bracket for auxiliary units ➔ [page 23](#) .

- Tie up removed AC compressor with connected refrigerant hoses to the body.

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Vehicles with auxiliary heating

- Disconnect the necessary connections at the coolant pipes and at the coolant shut-off valve of heating system - N279- .
- Only remove long exhaust pipe of auxiliary heater ➔ Heating, air conditioning ➔ Rep. gr. 82 ,

Continued for all vehicles

- Remove charge air hoses and charge air pipe between engine and charge air cooler:
- ♦ Motor code BKD, AZV: ➔ [page 191](#)
- ♦ Engine code BMM: ➔ [page 196](#)



Caution

Shut off the openings of the charge air cooler, e.g. with a clean piece of foam, so that no coolant can get in.

- Remove fan shroud and radiator.
- ♦ Motor code BKD, AZV: ➔ [page 138](#)
- ♦ Engine code BMM: ➔ [page 146](#)
- Remove holder of the wire for oil level and oil temperature sender - G266- from assembly carrier.

- First, unscrew the screw -1-.
- Then unscrew screws -2- and -3- and remove the pendulum support.

Vehicles with four-wheel drive

- Remove assembly carrier without steering gear ⇒ Chassis ⇒ Rep. gr. 40 .
- Remove propshaft from gearbox ⇒ Gearbox ⇒ Rep. gr. 39 .

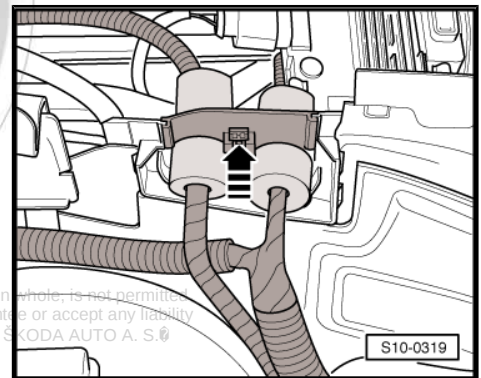
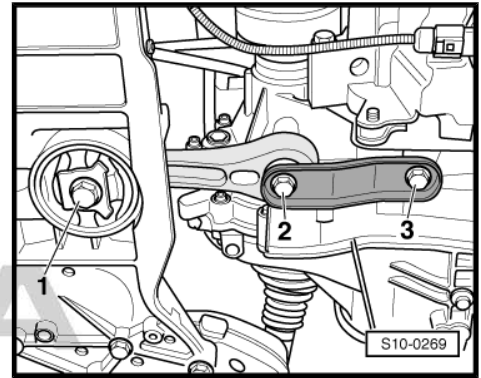
Continued for all vehicles



Caution

The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.

- Remove the pre-exhaust pipe from the exhaust turbocharger ⇒ [page 229](#) .
- Unlatch the fuse and disconnect the front plug from the engine control unit ⇒ [page 227](#) .
- Release duct for engine wiring harness -arrow- and pull out upwards.



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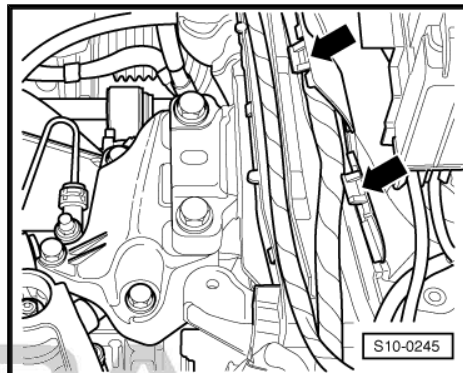
- Open the cable guides -arrows-, remove the engine wiring harness and place down to the side.
- Release all remaining plugs at engine and gearbox and lay aside the relevant lines.



Note

To release the plug of the engine speed sensor - G28- , push down on the plug with a screwdriver while lifting the release button with a thin wire hook.

- Detach all connecting and vacuum hoses from the engine as well as the coolant hoses.



Vehicles fitted with a manual gearbox

- Remove shift mechanism from gearbox ⇒ gearbox ⇒ Rep. gr. 34 .
- Remove pressure line from breather/slave cylinder ⇒ Gearbox ⇒ Rep. gr. 30 .



WARNING

After separating the hydraulic line, do not operate the clutch pedal.

Vehicles with automatic gearbox

- Remove shift mechanism from gearbox ⇒ gearbox ⇒ Rep. gr. 34 .

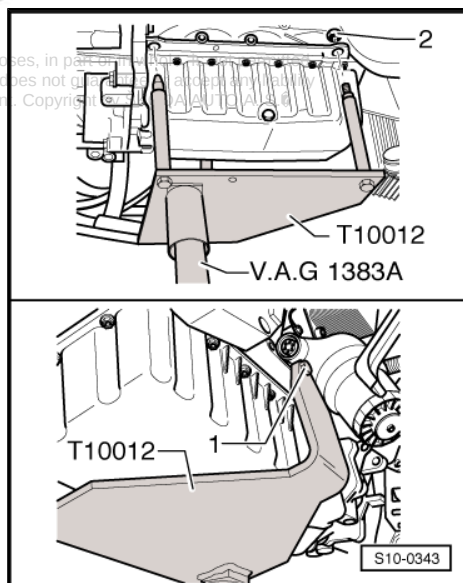
Continued for all vehicles

- Screw engine mount - T10012- to the cylinder block with nut -2- and screw -1- to 20 Nm.
- Insert engine/gearbox jack - V.A.G 1383 A- in the engine mount and slightly raise.

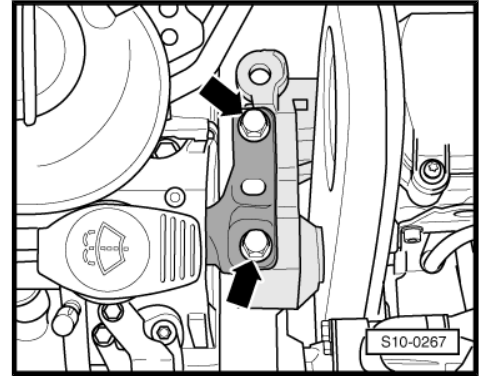


WARNING

Use double ladder to release the screws for the engine/gearbox mounting.



- Successively release screws for engine mounting -arrows-.



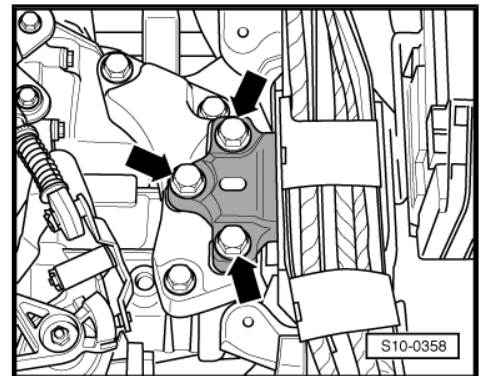
- Successively release screws for gearbox mounting -arrows-.



Note

- ◆ Check whether all hose and line connections between engine, gearbox and body are released.
- ◆ When lowering carefully guide the engine with the gearbox, in order to avoid damage.

- Carefully lower engine with gearbox.
- Remove the gearbox from the engine ⇒ gearbox ⇒ Rep. gr. 34 .

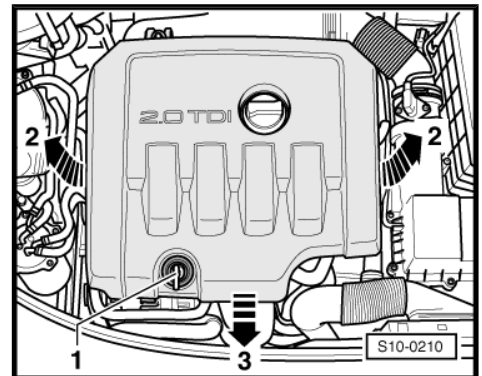


1.1.1 Removing and installing engine trim panel

Removing

Vehicles with engine code BKD, AZV

- Remove dipstick -1- from dipstick guide.
- Lift engine cover at the sides -arrows 2- and pull out towards the front -arrow 3-.
- Insert the dipstick into the dipstick guide so that no parts fall into the opening.





Vehicles with engine code BMM

- Remove outer -1- and inner -2- engine cover by pulling evenly upwards.

Installing



Note

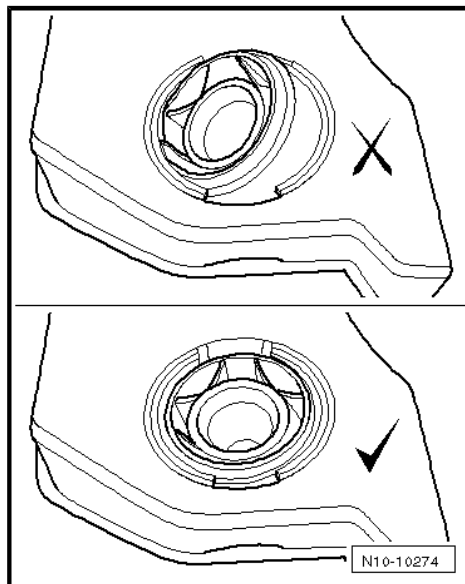
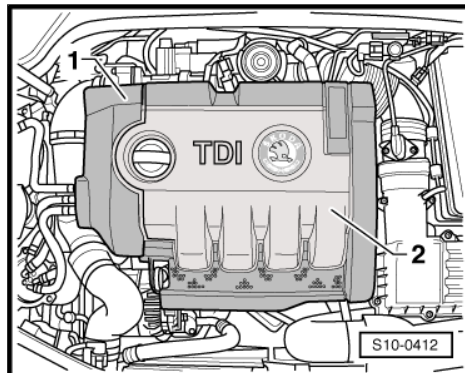
On vehicles with engine code BKD, AZV, the oil dipstick must be pulled out of the dipstick guide before installation and pushed back into the oil dipstick guide after installation.



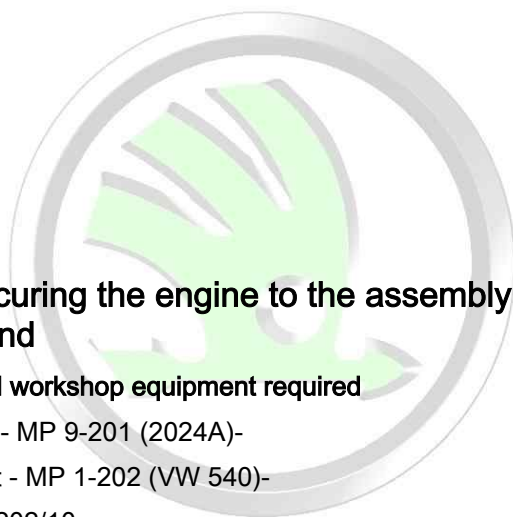
Caution

Before installing the engine cover, check the correct installation position of the 4 fastening elements (ball sockets). Put them back in the correct positions if necessary. Otherwise this can lead to damage to the engine cover.

- If necessary, press the ball sockets into the correct positions.
- Place the engine cover onto the fixing points and press it into the catches.



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1.2 Securing the engine to the assembly stand

Special tools and workshop equipment required

- ◆ Lifting device - MP 9-201 (2024A)-
- ◆ Engine mount - MP 1-202 (VW 540)-
- ◆ Hook - MP 1-202/10-
- ◆ Bushing - T30010 (VW 540/1B)-
- ◆ Assembly stand - MP 9-101-
- ◆ Workshop crane , e.g. -VAS 6100-

Work procedure

- Separate engine from gearbox.



WARNING

Use securing pins on the hooks and rig pins to prevent release.

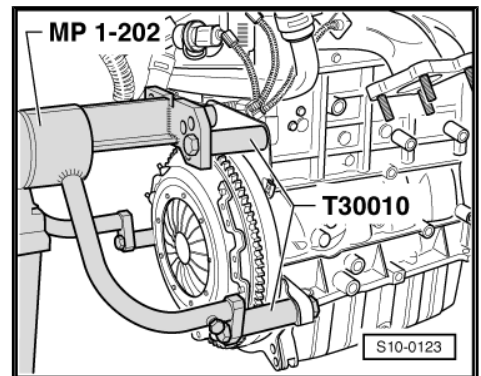
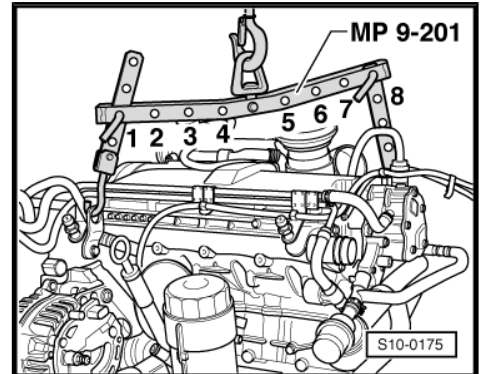
- Attach lifting device - MP 9-201- at engine and at workshop crane , e.g. -V.A.G 1202A- .

Belt pulley side: 2nd hole of the extension in Position 1.

Flywheel side: 2nd hole of the extension in Position 8.

- Lift engine with assembled engine mount - T10012- out of the engine/gearbox jack using the workshop crane .
- Remove engine mount - T10012 - .

- To carry out assembly work, use the engine bracket - MP 1-202- , adapter - MP 1-202/10- and bushing - T30010 - to secure the engine to the assembly stand - MP 9-101- ; (the illustration shows the 1.9 l/47 kW SDI engine; attachment is identical).



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1.3 Installing engine

Installation occurs in reverse order to removal. Pay attention to the following:



Note

- ◆ *When performing installation work replace the self-locking nuts.*
- ◆ *Replace screws which have been tightened to a torquing angle as well as sealing rings and seals.*
- ◆ *Fit all cable straps on again in the same place when installing.*
- ◆ *Secure all hose connections with corresponding hose clips.*



Caution

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *To avoid damage to lines/wiring, ensure sufficient clearance to all moving or hot components.*



Observe all safety measures and notes for assembly work on the fuel supply and injection system, at the charge air system and observe as well the rules for cleanliness ➔ [page 2](#) .

Engines for manual gearboxes



Note

- ◆ *Clean the drive shaft serration and hub serration on used clutch discs, remove corrosion and only apply a very thin layer of grease - G 000 100- on the serration. Subsequently move the clutch disc up and down on the drive shaft until the hub fits smoothly on the shaft. Always remove excess grease.*
- ◆ *After installing the coupling, check the centering of the clutch disc ➔ gearbox ➔ Rep. gr. 30 .*
- ◆ *Check the clutch release bearing for wear. Replace release bearing if worn ➔ gearbox ➔ Rep. gr. 30 .*

Engines for automatic gearboxes

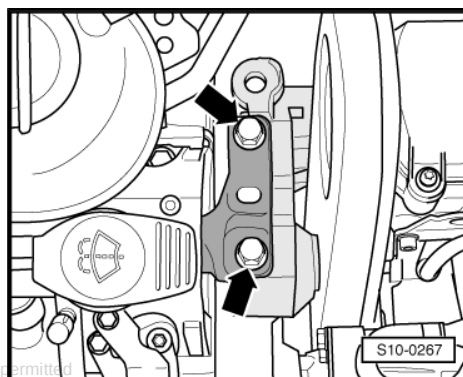
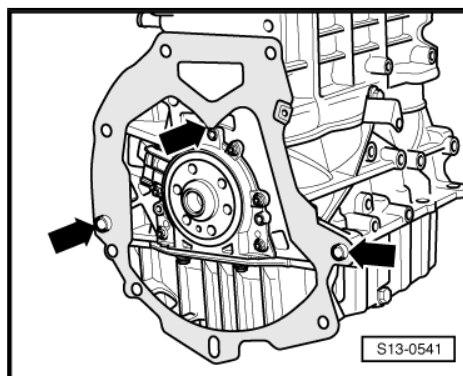
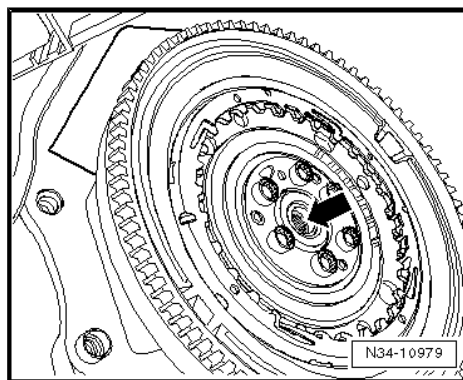


Note

- ◆ *Replace the needle bearing -arrow- in the crankshaft ➔ [page 62](#) .*
- ◆ *Lightly grease the stud of the gearbox drive shaft with the high-temperature grease - G 052 133 A2- . Do not grease the serration of the drive shaft.*

Continue for all engines

- Check whether the dowel sleeves for centring the engine/ gearbox are present in the cylinder block; insert if necessary.
- Ensure that the intermediate plate has been inserted on the sealing flange and is pushed onto the dowel sleeves -arrows-.
- Screw on gearbox to engine ➔ gearbox ➔ Rep. gr. 34 .
- Insert engine with gearbox into the body.



- Successively screw in screws for engine mounting -arrows- by hand.

- Successively screw in screws for gearbox mount -arrows- by hand.
- Adjust assembly bracket ⇒ [page 20](#) and tighten screws ⇒ [page 19](#) .
- Remove engine mount - T10012- from engine.

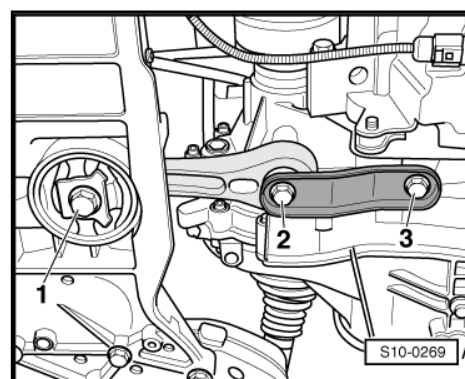
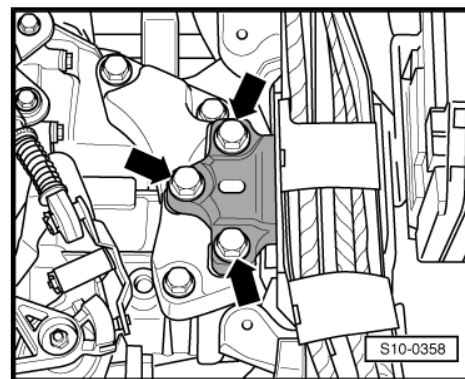
Vehicles with four-wheel drive

- Attach propshaft to gearbox ⇒ Gearbox ⇒ Rep. gr. 39 .
- Attach assembly carrier without steering gear ⇒ Chassis ⇒ Rep. gr. 40 .

Continued for all vehicles

- Screw on pendulum support with new screws -2- and -3- at gearbox and then tighten with new screw -1- at assembly carrier.

Tightening torque: ⇒ [page 19](#)



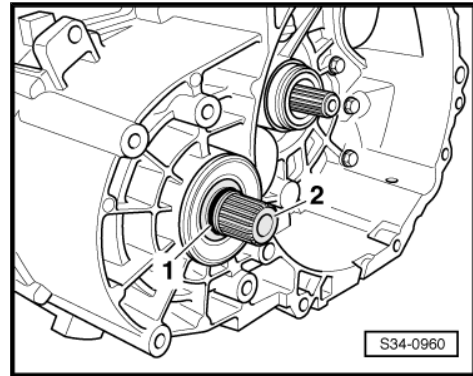
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- For gearboxes with drive shaft, replace the O-ring -1- on the right side of the drive shaft and grease the serration -2- with universal grease.
- Attach the right drive shaft and screw the left drive shaft onto the drive flange ⇒ Suspension ⇒ Rep. gr. 40 .
- Install pre-exhaust pipe ⇒ [page 229](#) and align exhaust system free of stress ⇒ [page 239](#) .
- Connect hydraulic line to hydraulic clutch control cylinder and bleed the clutch hydraulics ⇒ Gearbox ⇒ Rep. gr. 30 .
- Attach the shift mechanism to the gearbox and adjust ⇒ Gearbox ⇒ Rep. gr. 34 .
- Fit fan shroud and radiator.
- ◆ Motor code BKD, AZV: ⇒ [page 138](#)
- ◆ Engine code BMM: ⇒ [page 146](#)



Vehicles with auxiliary heating

- Fit coolant hoses to the auxiliary heating and to the coolant tubes.
- Fit long exhaust pipe of auxiliary heater ⇒ Heating, air conditioning ⇒ Rep. gr. 82 ,

Vehicles with air conditioning

- Install AC compressor at the bracket for auxiliary units ⇒ [page 23](#) .

Continued for all vehicles

- Install alternator ⇒ Electrical System ⇒ Rep. gr. 27 .
- Install the V-ribbed belt ⇒ [page 23](#) .
- Connect all connecting, fuel, cooling fluid, vacuum and suction hoses to the engine.
- Observe the assembly instruction for hose connections with push-fit couplings ⇒ [page 198](#) .
- Connect electrical connections and attach cables ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install battery ⇒ Electrical System ⇒ Rep. gr. 27 .
- Install bulkhead plenum chamber and plenum chamber cover ⇒ Body Work ⇒ Rep. gr. 66 .
- Install wiper arms ⇒ Electrical System ⇒ Rep. gr. 92 .
- Top up coolant ⇒ [page 135](#) , ⇒ [page 143](#) .
- Checking the oil level ⇒ Maintenance ; Booklet Octavia II .
- Install the noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Install bottom part of right wheelhouse liner ⇒ Body Work ⇒ Rep. gr. 66 .
- Perform a test drive.
- Query all fault memories, rectify any faults and delete fault memories ⇒ Vehicle diagnostic tester.



Note

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After deleting the event memory of the engine control unit the readiness code must be re-generated.

Specified torques

Component		Nm
Screws or nuts	M 6	9
	M 7	13
	M 8	20
	M 10	40
	M 12	70
Engine/gearbox connecting screws ➔ gearbox ➔ Rep. gr. 34		

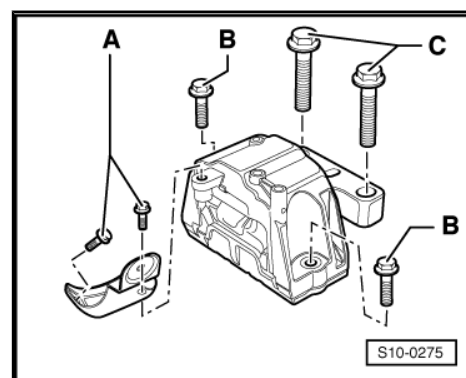
1.4 Unit mounting - tightening torques

Unit mounting for engine

A - 20 Nm + torque a further 90° (1/4 turn) - replace

B - 40 Nm + torque a further 90° (1/4 turn) - replace

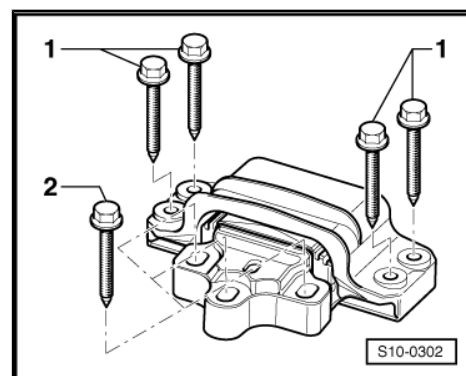
C - 60 Nm + torque a further 90° (1/4 turn) - replace



Unit mounting for gearbox

1 - 40 Nm + torque a further 90° (1/4 turn) - replace

2 - 60 Nm + torque a further 90° (1/4 turn) - replace



Pendulum support

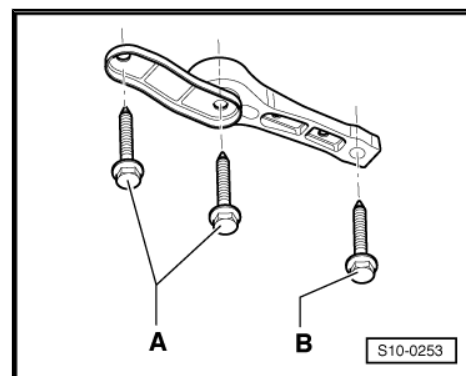
A (strength category 8.8) - 40 Nm + torque a further 90° (1/4 turn) - replace

A (strength category 10.9 ¹⁾) - 50 Nm + torque a further 90° (1/4 turn) - replace

B - 100 Nm + torque a further 90° (1/4 turn) - replace

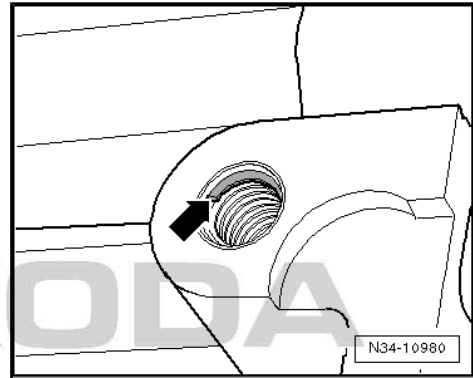
Remove: First remove screw -B-, then screws -A-.

Install: First tighten screws -A-, then screw -B-.





¹⁾On manual gearbox MQ350 (02Q), only use the screws with the strength category 10.9 if threaded inserts (e.g. Heli Coil) -arrow- have been installed.



1.5 Checking and adjusting the assembly bracket

1.5.1 Checking the assembly bracket

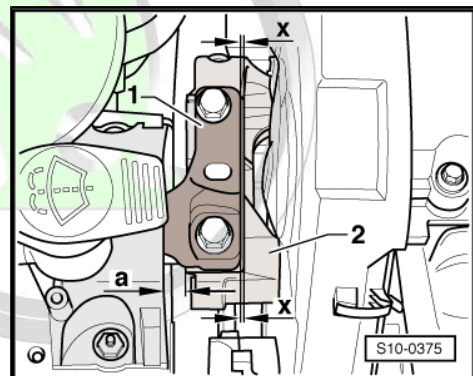
Check dimensions on the right hanger for engine/gearbox unit:

- Between engine bracket and engine support there must be a distance -a- of 10 ... 13 mm.
- The cast iron edge on the engine support -2- must be parallel to the supporting arm -1- the dimension -x- must be the same at the front and rear.



Note

The distance -a- can be checked, for example with suitable round bars.



Only if there is an acoustic complaint (engine or gearbox knock on the frame side rail when cornering) and the dimension -a- is outside 10 ... 13 mm:

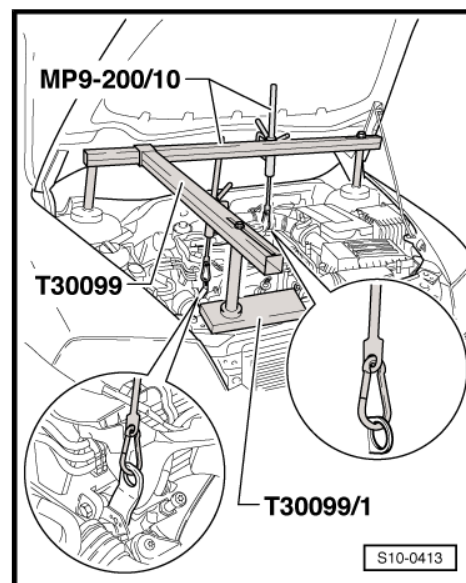
- Adjust the assembly bracket ⇒ [page 20](#) .

1.5.2 Adjusting the unit mounting

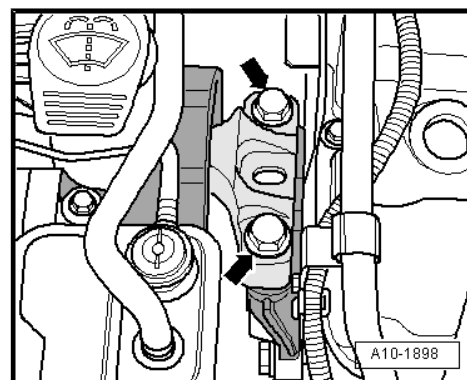
Special tools and workshop equipment required

- ◆ Supporting device - T30099-
- ◆ Surface - T30099/1-
- ◆ Hook - MP 9-200/10 (10-222A/10)-
- Remove battery and battery tray ⇒ Electrical System ⇒ Rep. gr. 27 .
- Remove the cooling water tank cover ⇒ Body Work ⇒ Rep. gr. 66 .

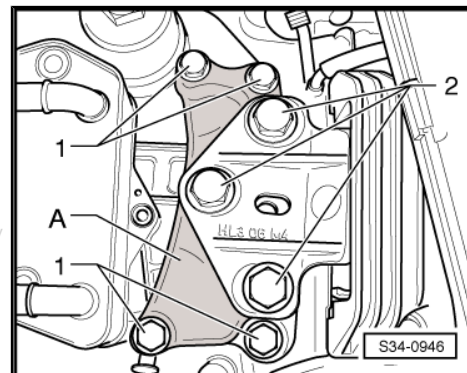
- Position supporting device - T30099- and base - T30099/1- and support the engine/gearbox unit in its installed position.
- Uniformly pre-tension the engine/gearbox unit with both spindles, but do not raise.



- Release the screws -arrows- of the assembly bracket at the engine.



- Slightly loosen the screws -2- of the unit mounting at the gear-box (less than 1 revolution).
- Successively replace all the screws of the assembly bracket (as long as it has not already been performed when installing the engine) and insert these loosely.



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- Move the engine/gearbox assembly with an assembly lever between engine support -1- and supporting arm -3- for engine mount until the following dimensions are set:
- Between engine bracket and engine support there must be a distance -a- of 10 mm.
- The cast iron edge on the engine support -2- must be parallel to the supporting arm -1- the dimension -x- must be the same at the front and rear.

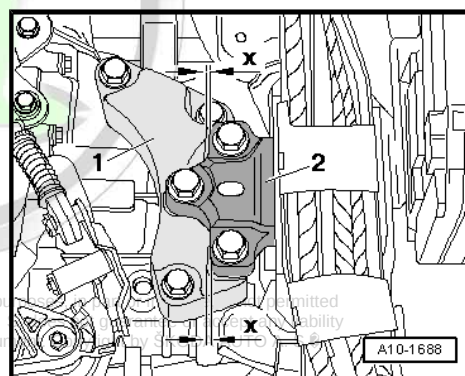
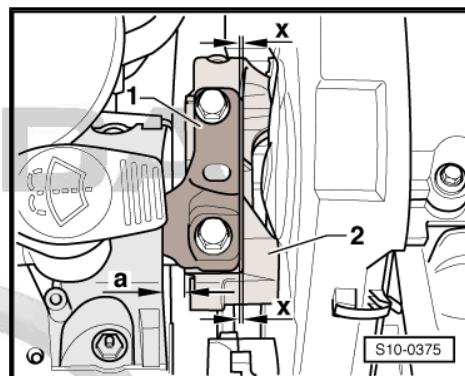


Note

The distance -a- = 10 mm can be checked e.g. with suitable round bars.

- Tighten screws for engine assembly bracket ➔ [page 19](#) .
- Make sure that on the gearbox side the edges of the supporting arm -2- and gearbox support -1- are parallel.
- The dimension -x- must be the same on both mount sides.
- Tighten screws for gearbox assembly mounting ➔ [page 19](#) .

Further installation occurs in reverse order.



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13 – Crankshaft group

1 Disassembling and assembling engine

1.1 Removing and installing V-ribbed belt

1 - Belt pulley - crankshaft

- ☐ with vibration damper
- ☐ can be installed only in one position

2 - Cap

- ☐ for vibration damper
- ☐ mounted up to 05.05

3 - 10 Nm + torque a further 90° (1/4 turn)

- ☐ replace

4 - Tensioning device for V-ribbed belt

- ☐ swivel tensioning device for V-ribbed belt with open-end wrench to slacken the V-ribbed belt
- ☐ Tensioning device can be locked with locking pin - T10060A- or Allan key.

5 - 23 Nm

6 - Screw for guide pulley

- ☐ only for vehicles with engine code BKD, AZV
- ☐ replace
- ☐ different screws for vehicles with smaller or larger engine support
- ☐ Tightening torque:

♦ Vehicles with smaller engine support: ➔ [page 24](#)

♦ Vehicles with larger engine support: ➔ [page 25](#)

7 - Guide pulley

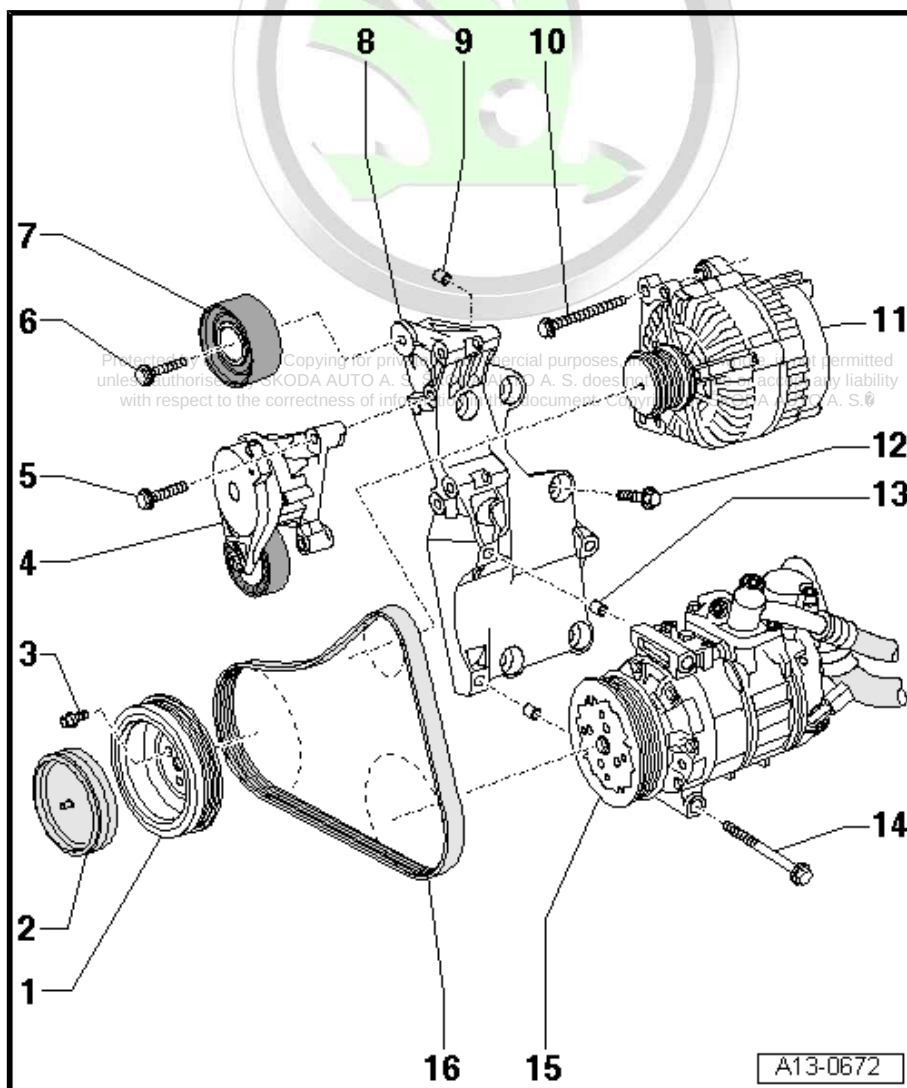
- ☐ for toothed belt
- ☐ only for vehicles with engine code BKD, AZV

8 - Bracket for auxiliary units

- ☐ Tightening sequence ➔ [page 24](#)

9 - Fitting sleeve

- ☐ pay attention to correct fit in the holder





10 - 23 Nm

11 - AC generator

- ☐ removing and installing ⇒ Electrical System ⇒ Rep. gr. 27
- ☐ to facilitate positioning, push the threaded bushings of the fixing screws on the generator backwards slightly

12 - 45 Nm

- ☐ Observe tightening sequence ⇒ [page 24](#)

13 - Fitting sleeve

- ☐ 2 pieces
- ☐ pay attention to correct fit in the holder

14 - 25 Nm

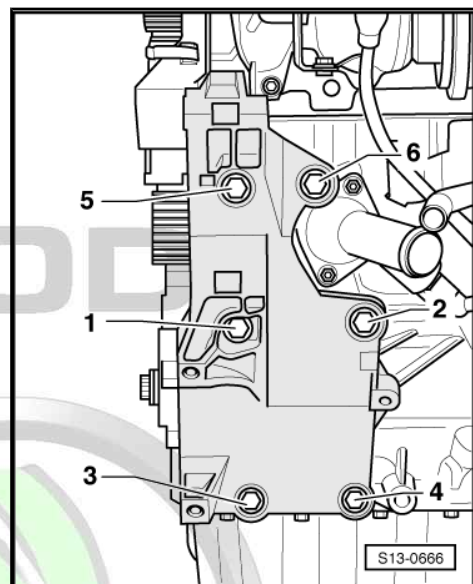
15 - AC compressor

16 - V-ribbed belt

- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ check for wear
- ☐ do not kink
- ☐ Removing ⇒ [page 25](#)
- ☐ installing ⇒ [page 26](#)

Bolts at bracket for auxiliary units - tightening sequence

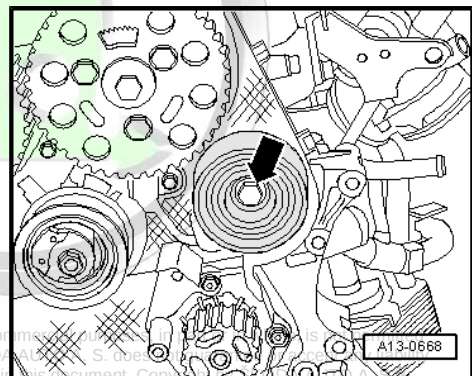
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Tightening torque of guide pulley - vehicles with small engine support (only for vehicles with engine code BKD, AZV)

Unscrew screw -arrow- without inside thread.

- Tightening torque: 40 Nm + torque a further 90° (1/4 turn).



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**Guide pulley tightening torque - vehicles with large engine support
(only for vehicles with engine code BKD, AZV)**

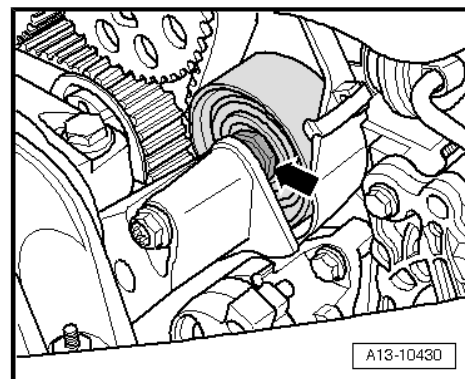
Screw -arrow- with inside thread for fixing the engine support.

- Tightening torque: 90 Nm + torque a further 90° ($\frac{1}{4}$ turn).

Removing

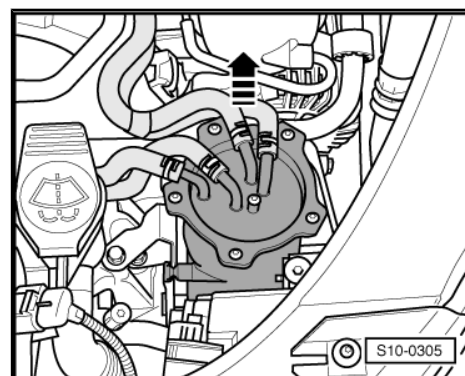
- Remove engine cover ⇒ [page 13](#) .

Vehicles up to 08.05



- Unlatch fuse, remove fuel filter upwards from bracket -arrow- with its connected lines, and place to the side.

Vehicles as of 08.05



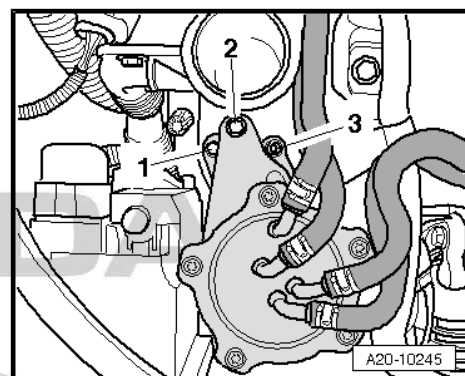
- Release screw -1- by one turn.
- Release screw -2- and nut -3-.
- Take out fuel filter with connected hoses and lay to the side.

Continued for all vehicles



Note

Mark the direction of rotation with chalk or a felt-tip pen before removing the V-ribbed belt. Reversing the rotation direction of an already used belt may destroy it.



Vehicles with auxiliary heating

- Remove bottom part of right wheelhouse liner ⇒ Body Work
⇒ Rep. gr. 66 .

Continued for all vehicles



- Swing the tensioning device in -the direction of the arrow- de-tension the V-ribbed belt.
- Hold the tensioning device and remove the de-tensioned V-ribbed belt.

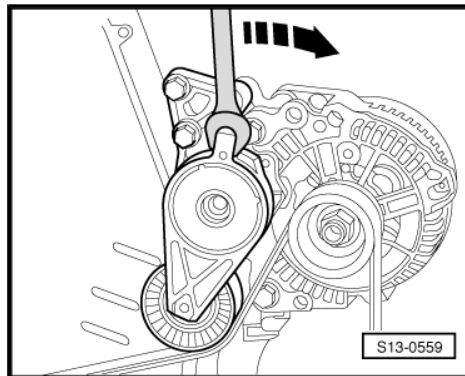
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Note

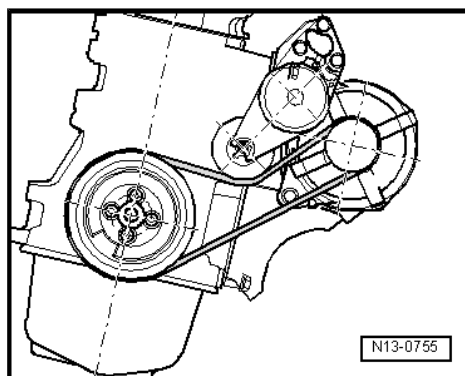
Before fitting the V-ribbed belt make sure that all assemblies (generator and AC compressor) are securely mounted.



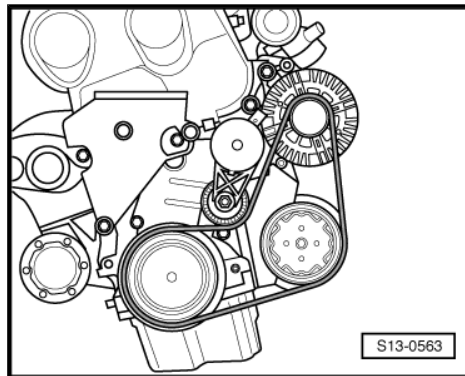
Vehicles without air conditioning system

- First lay the V-ribbed belt on the belt pulley of the crankshaft and generator, then release the tensioning device.

Vehicles with air conditioning



- First position the ribbed V-belt on the belt pulleys of the crankshaft and AC compressor and on the belt pulley of the generator last; then release the tensioning device.
- Check correct positioning of the ribbed V-belt on the belt pulleys.
- Start engine and check ribbed V-belt run.



1.2 Removing and installing toothed belt for engines with code BKD, AZV

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1.2.1 Summary of components - part 1

1 - Cap

- ☐ for vibration damper
- ☐ mounted up to 05.05

2 - 10 Nm + torque a further 90° (1/4 turn)

- ☐ replace

3 - Belt pulley - crankshaft

- ☐ with vibration damper
- ☐ can be installed only in one position
- ☐ Adjust TDC for cylinder 1 with vibration damper installed ➔ [page 29](#)

4 - 10 Nm

- ☐ insert using locking agent - D 000 600 A2-

5 - 40 Nm + torque a further 180° (1/2 turn)

- ☐ replace
- ☐ Observe tightening sequence ➔ [page 30](#)

6 - Engine support bracket

- ☐ From 05.05, the engine support is installed with a different mount ➔ [page 30](#)

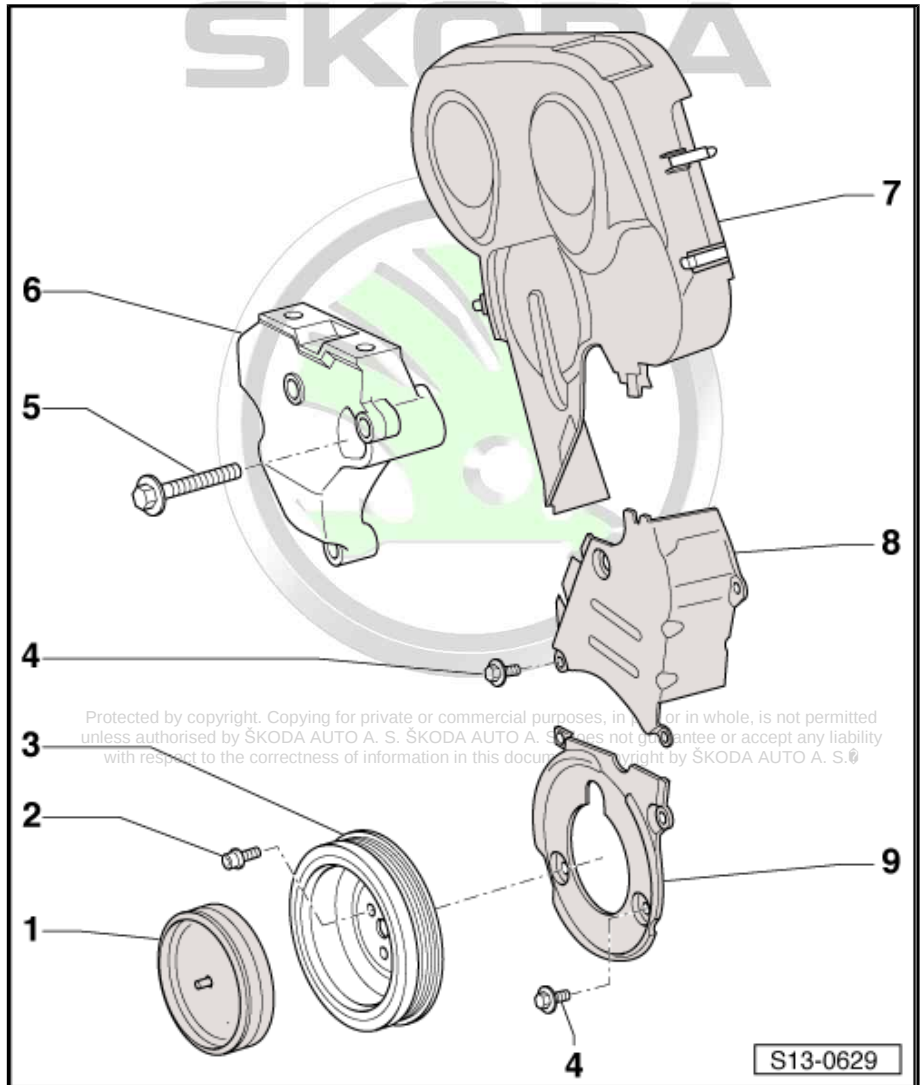
7 - Top toothed belt guard

- ☐ when installing in toothed belt guard, carefully insert middle part

8 - Middle toothed belt guard

- ☐ to remove, remove top toothed belt guard and unscrew tensioning device for ribbed V-belt.
- ☐ Adjust TDC for cylinder 1 with vibration damper installed ➔ [page 29](#)

9 - Bottom toothed belt guard



1.2.2 Summary of components - part 2



Note

Mark the direction of rotation with chalk or a felt-tip pen before removing the toothed belt. Reversing the rotation direction of an already used belt may destroy it.



1 - 120 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ do not oil
- ☐ to release and tighten use counterholder - T30004 - or counterholder - MP 1-310 (3099)-

2 - 20 Nm

- ☐ self-locking, replace

3 - Small guide pulley

4 - 20 Nm + torque a further 45° (1/8 turn)

5 - Tensioning pulley

- ☐ The eccentric of the new version has an additional hole for 6 mm hexagon socket wrench
⇒ [page 29](#)

6 - Toothed belt

- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ check for wear
- ☐ do not kink
- ☐ Removing ⇒ [page 30](#)
- ☐ install (set the timing) ⇒ [page 35](#)

7 - 25 Nm

8 - Toothed belt pulley, exhaust camshaft

- ☐ Check fitting position

9 - 25 Nm

10 - Toothed belt pulley, inlet camshaft

- ☐ Check fitting position

11 - 100 Nm

- ☐ to release and tighten use counterholder - T10051 -

12 - 100 Nm

- ☐ to release and tighten use counterholder - T10051 - ⇒ [page 98](#)

13 - Hub

- ☐ For exhaust camshaft.
- ☐ to remove use extractor - T10052-

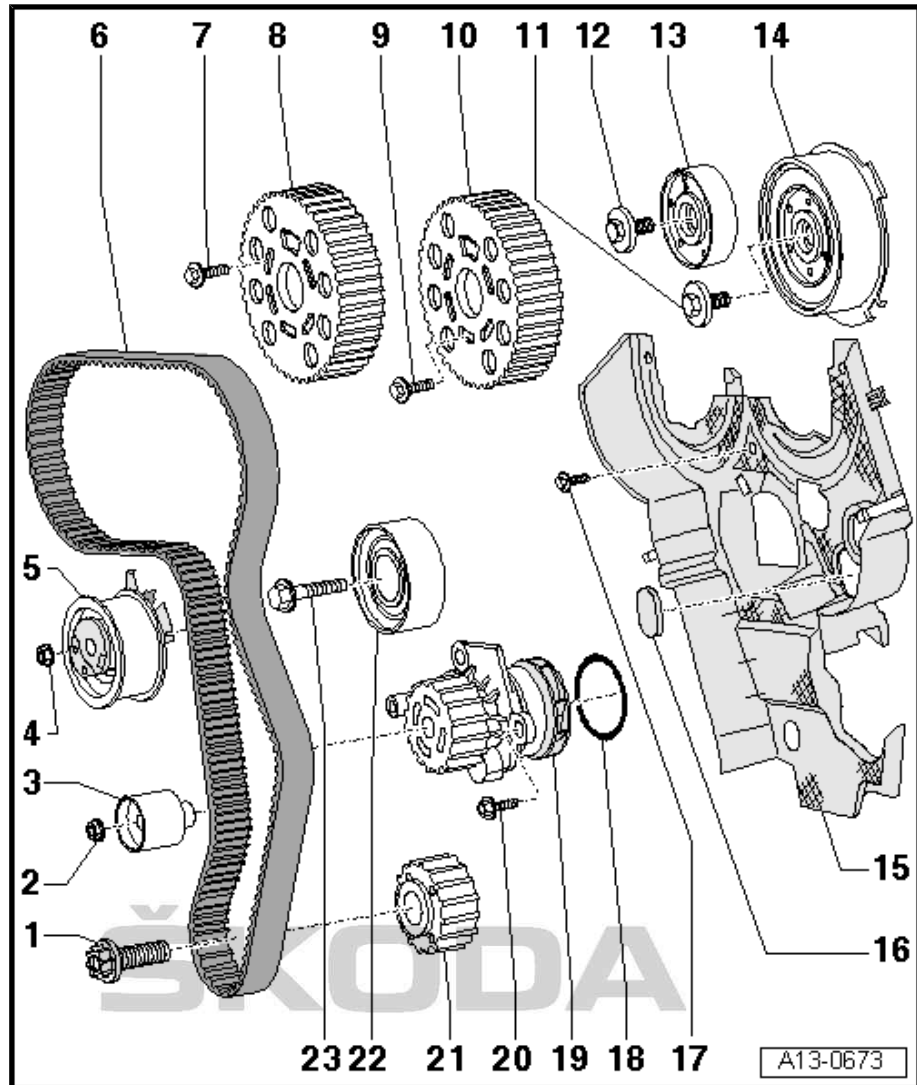
14 - Hub

- ☐ for intake camshaft with rotor for Hall sender - G40-
- ☐ to remove use extractor - T10052- ⇒ [page 98](#)

15 - Rear toothed belt guard

16 - Rubber bowl

- ☐ to remove the Hall sender - G40- (rear toothed belt guard does not have to be removed)
- ☐ Replace if damaged.



17 - 10 Nm

- ☐ insert using locking agent - D 000 600 A2-

18 - O-ring

- ☐ replace

19 - Coolant pump

- ☐ Removing and installing ⇒ [page 147](#)

20 - 15 Nm

21 - Crankshaft toothed belt sprocket

- ☐ there must not be any oil present on the contact surface between the pulley and the crankshaft
- ☐ can be installed only in one position

22 - Large guide pulley

23 - Screw for guide pulley

- ☐ replace
- ☐ different screws for vehicles with smaller or larger engine support
- ☐ Tightening torque:

◆ Vehicles with smaller engine support: ⇒ [page 24](#)
◆ Vehicles with larger engine support: ⇒ [page 25](#)

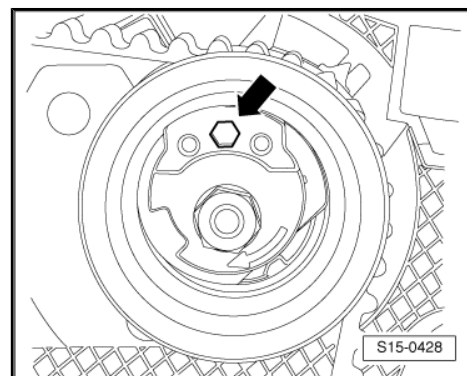
Tensioning pulley

Additional hole in the eccentric of the tensioning pulley for 6 mm hexagon socket wrench -arrow-.



Note

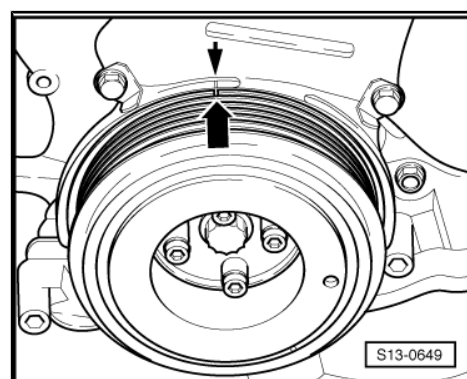
The tensioner pulley of the new version can be adjusted with the special two-hole nut turner , e. g. -T10020- , or using a commercially available 6 mm hexagon socket wrench.



Adjust TDC for cylinder 1 with vibration damper installed

- Turn the crankshaft in the direction of engine rotation at the central screw so that the notch on the vibration damper (TDC marking for cylinder 1) -large arrow- is in line with the embossed arrow -small arrow- on the middle toothed belt guard as shown.

Use the mirror to do this.





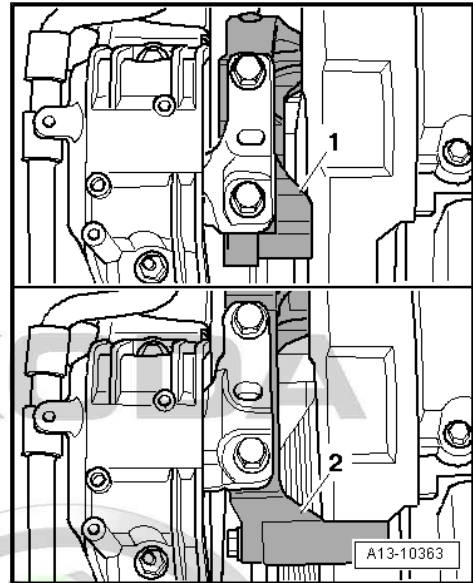
Engine support bracket

On vehicles manufactured from 05.05, the engine support -2- is in-built.



Note

When removing the toothed belt, it is not necessary to remove the engine support.



Tightening order for engine support



Caution

The tightening sequence and the tightening torque of the fixing screws for the engine support must definitely be respected. Otherwise stress of the engine support bracket occurs, which results in the breaking of the engine support bracket.

1. Screw in screws -1...3- by hand first.
2. Then tighten the screws to 40 Nm in the sequence -1...3-.
3. Then tighten the screws a further 180° (1/2 turn) in the sequence -1 ... 3-.

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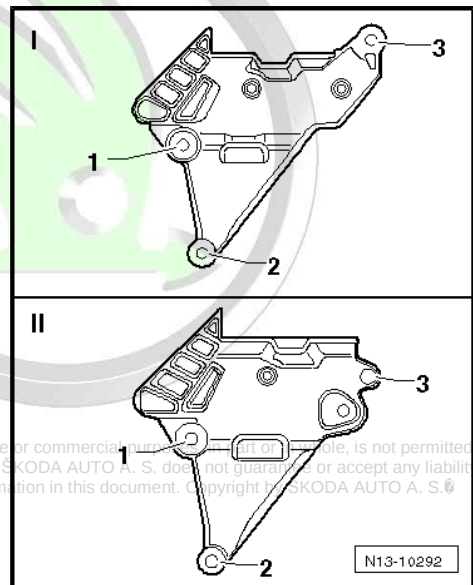


Note

- ♦ To do so, lift or lower the engine with the supporting device - T30099 -.
- ♦ Before the engine mount is installed, all the screws of the engine support must be tightened to the specified tightening torque.

I: Engine support for vehicles until 05.05

II: Engine support for vehicles from 05.05

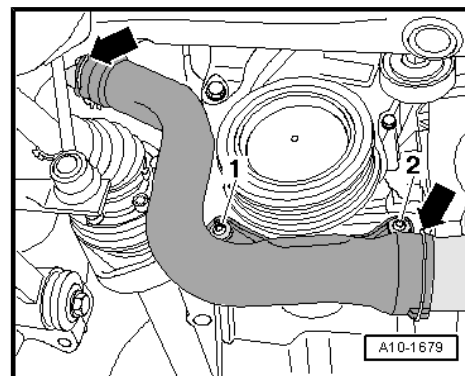
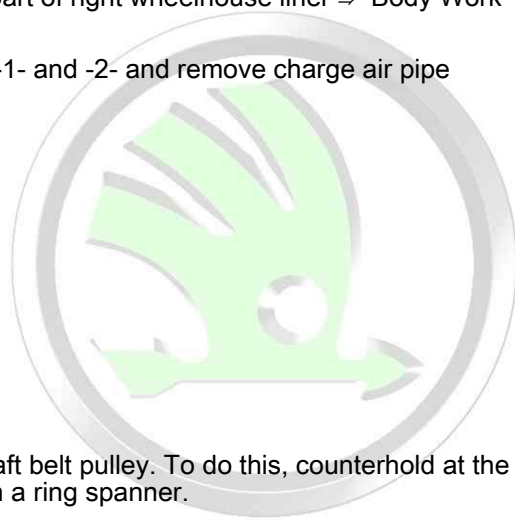


1.2.3 Removing toothed belt

Special tools and workshop equipment required

- ♦ Supporting device - T30099-
- ♦ Surface - T30099/1-
- ♦ Hook - MP 9-200/10 (10-222A/10)-
- ♦ Rig pin for the injection pump - 3359- or -MP 1-301 - (2x)
- ♦ Locking pin - T10060- or -T10060A -
- ♦ Crankshaft arrester - T10050- or - T10100-

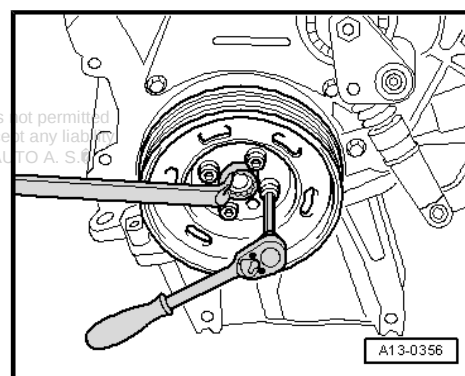
- ◆ Pressure pad - T10172 - with stud - T10172/4-
- ◆ Offset screwdriver - T10264-
- ◆ Rig tool - T10265-
- ◆ Pliers for spring-type clips
- Remove V-ribbed belt ⇒ [page 23](#) .
- Remove bottom part of right wheelhouse liner ⇒ Body Work
⇒ Rep. gr. 66 .
- Unscrew screws -1- and -2- and remove charge air pipe
-arrows-.



- Remove crankshaft belt pulley. To do this, counterhold at the central screw with a ring spanner.

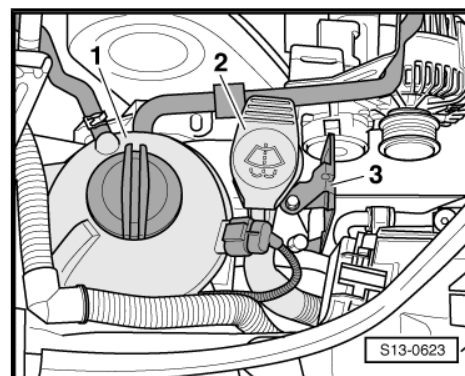
For vehicles manufactured up until 05.05:

- Safety instructions when working on the injection system
⇒ [page 3](#) .
- Disconnect the fuel supply hoses and fuel return hoses from
the fuel pipes at the body and at the engine.



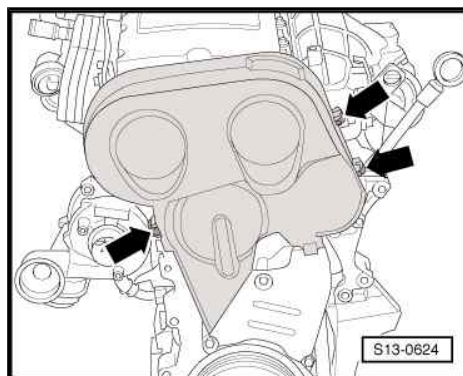
Continued for all vehicles

- Unscrew the screw on the filler neck -2- of the windscreen
washer tank.
- Unscrew the coolant expansion tank -1- and place to the side
with connected cables.





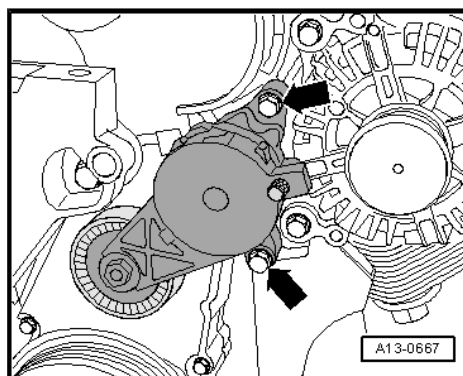
- Remove top toothed belt guard; to do so, release retaining clips -arrows-.



- Remove V-ribbed belt tensioning device -arrows-.
- Remove middle and bottom toothed belt guard.

For vehicles manufactured up until 05.05:

- Remove the cooling water tank cover ⇒ Body Work ⇒ Rep. gr. 66 .

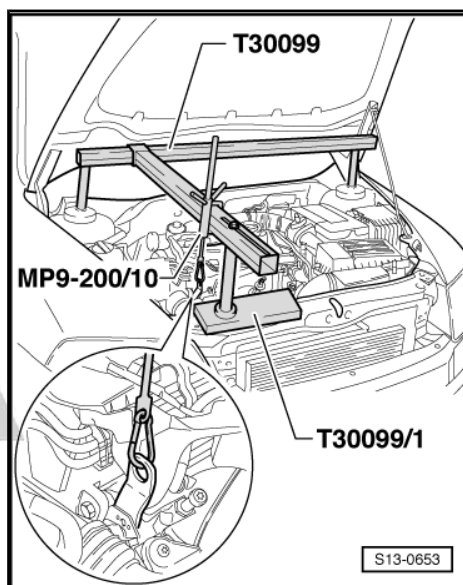


- Fit supporting device - T30099- and base - T30099/1 - , suspend engine/gearbox assembly from the right lifting eye with hooks - MP 9-200/10 - and pre-load using spindles, but do not raise.

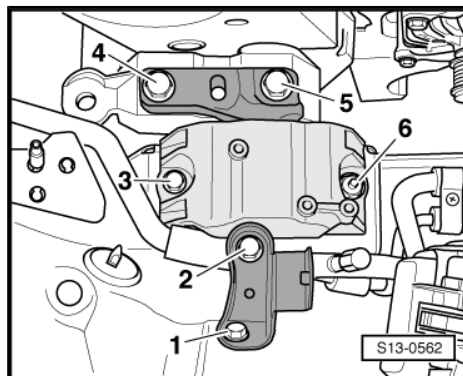


Note

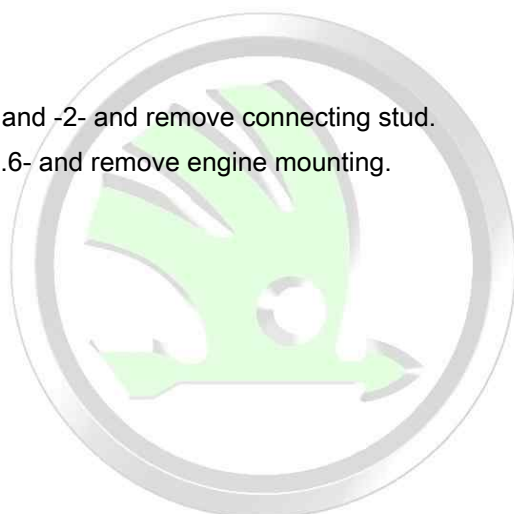
If the cylinder head needs to be removed, two spindles must be attached at the supporting device - T30099- ⇒ [page 73](#) .



- Release screws -1- and -2- and remove connecting stud.
- Release screws -3...6- and remove engine mounting.



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- Release screws -1 ... 3- for engine support and remove support.

Note

To release the screws for the engine support, lift or lower engine slightly via spindle on supporting device - T30099-.

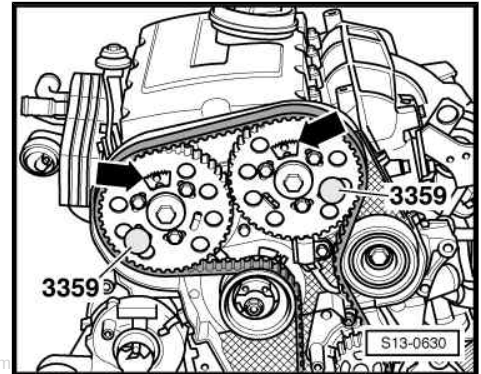
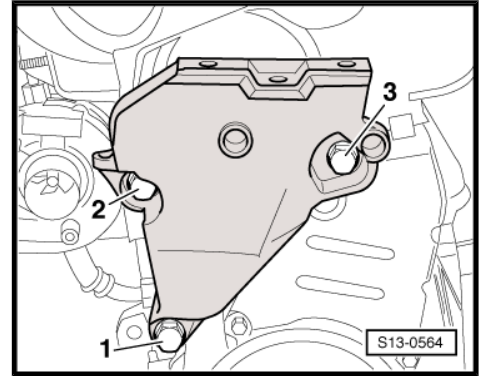
Continued for all vehicles



Caution

The engine may only be turned in the direction of engine rotation (clockwise) at the crankshaft.

- Rotate crankshaft to TDC for cylinder 1.
- The two tooth segments -arrows- on the camshaft wheels must both be at the top.
- Lock hubs using rig pins - 3359- .

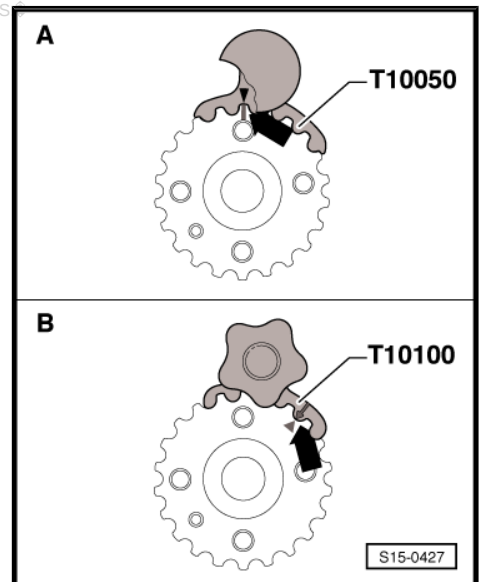


- Depending on the version, lock the crankshaft toothed belt sprocket using the crankshaft arrester - T10050- or crankshaft arrester - T10100- .

Distinguishing the crankshaft toothed belt sprocket:

A = original version of toothed belt sprocket with circular tooth flanks, rectangular TDC marking on tooth in 12 o'clock position for cylinder 1 - use crankshaft arrester - T10050 -

B = new version of toothed belt sprocket with elliptical tooth flanks, triangular TDC marking on the gap in the sprocket in 1 o'clock position - use crankshaft arrester - T10100-

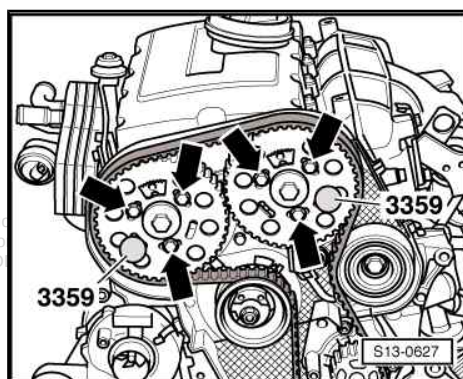
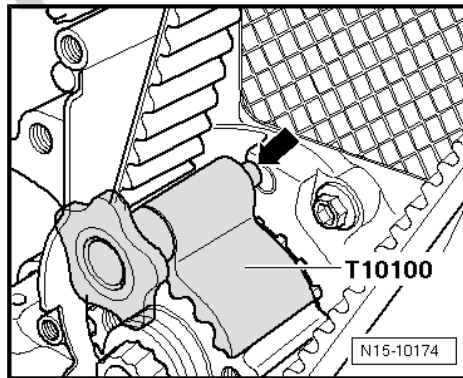




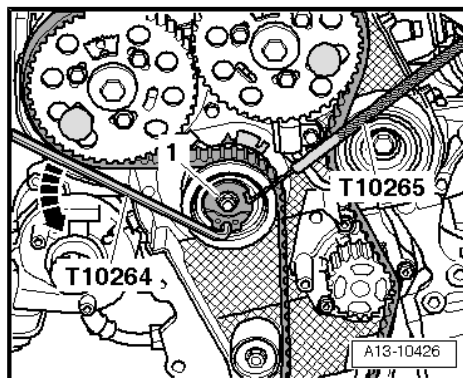
Note

- ◆ *Markings on the toothed belt sprocket and on the crankshaft arrester must be in line with each other -arrow-.*
- ◆ *The pin on the crankshaft arrester -arrow- must engage into the hole in the sealing flange.*
- ◆ *The crankshaft arrester can only be fitted onto the toothed belt sprocket from the front side of the serration.*
- Mark the direction of rotation of the toothed belt with chalk or a felt-tip pen.
- Loosen screws for toothed belt sprockets -arrows- by approx. 1 turn.

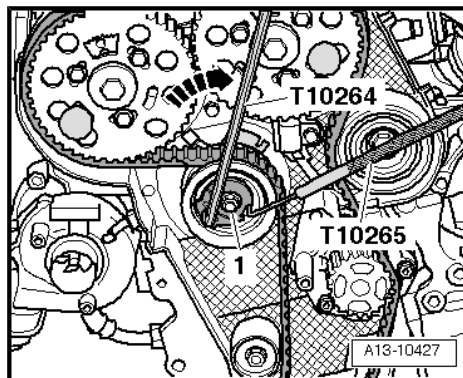
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- Loosen the fixing nut -1- of the tensioning pulley.
- Turn the eccentric of the tensioning pulley with the offset screwdriver - T10264- in anti-clockwise direction -arrow- until the tensioning pulley can be interlocked with the rig tool - T10265 -.



- Now turn eccentric of the tensioning pulley clockwise -arrow- as far as the stop and tighten fixing nut -1- by hand.
- Firstly remove toothed belt from coolant pump toothed belt sprocket and then from the other toothed belt sprockets.



1.2.4 Installing toothed belt (adjusting timings):



Caution

The following work sequence must be followed precisely.

- ◆ *If a final test is omitted, for example, and the pins are not reinserted, there is a risk that the timing will not be set correctly and the vehicle will have poor driving performance and uneven idling.*

- Lock camshaft with securing pins - 3359- or -MP 1-301- .
- Crankshaft is locked with crankshaft arrester - T10050- or crankshaft arrester - T10100- .
- Tensioning pulley is locked with rig pin - T10265- and fixed with fixing nut to the right stop.



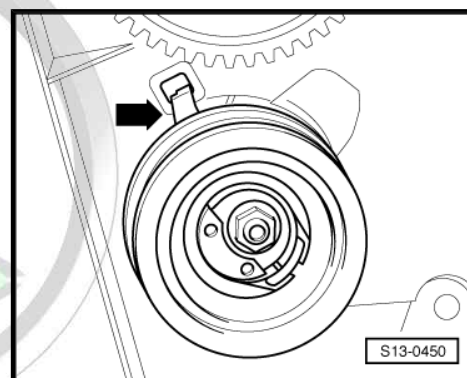
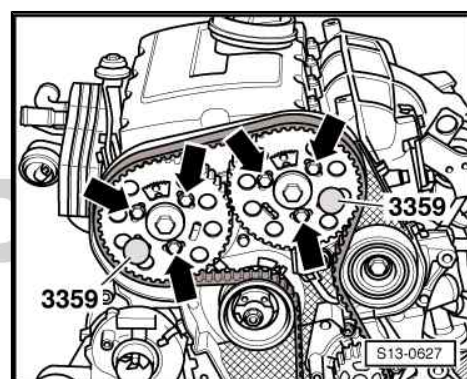
Note

- ◆ *Only ever perform adjustment work on the toothed belt on a cold engine.*
- ◆ *When rotating the camshaft, the crankshaft must not be positioned at TDC for any piston. Risk of damaging valves and pistons.*

- Slightly screw in screws -arrows-.
- Toothed belt sprockets must still turn on the hubs, but must not tilt.
- Turn toothed belt sprockets clockwise in the elongated holes as far as the stop.
- Fit toothed belt onto crankshaft toothed belt sprocket, tensioning pulley, large guide pulley and then finally the coolant pump toothed belt sprocket.

Set the tension of the timing belt as follows:

- Loosen the fastening nut of the tensioning pulley and remove the rig pin - T10265- from the tensioning pulley.
- Check the correct fitting of the tensioning pulley in the hole in the rear timing belt guard -arrow-.





- Turn the eccentric of the tensioning pulley clockwise using an offset screwdriver - T10264- until the pointer -2- is located centrally in the gap in the base plate.



Note

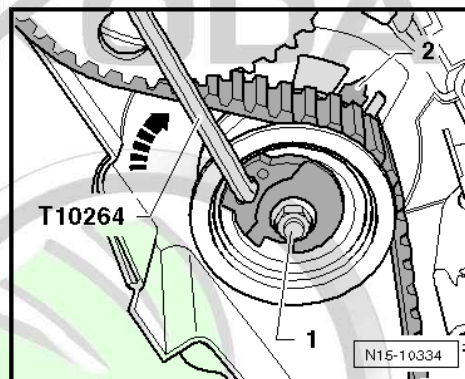
Ensure that the fixing nut does not turn.

- Hold the eccentric of the tensioning pulley in this position and tighten the fixing nut to 20 Nm plus a further 45° (1/8 turn).

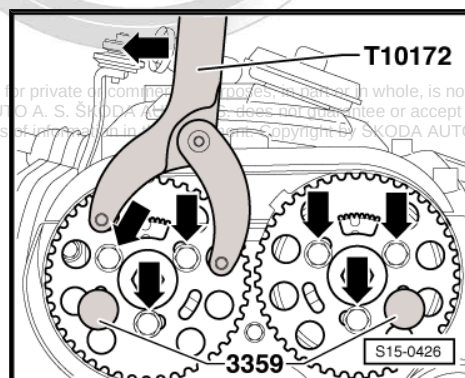


Note

When tightening the fixing nut, the pointer -arrow- turns max. 5 mm to the right from the gap of the base plate. This position must not be corrected, because the toothed belt settles when running-in.

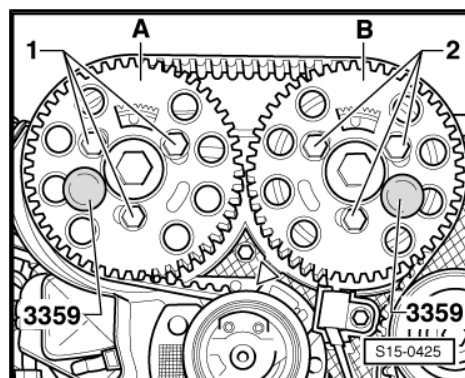


- Insert counterholder - T10172- with bolts - T10172/4- as shown and press in -direction of arrow-.
- Keep toothed belt sprockets pre-tensioned with counterholder - T10172- and tighten screws -arrows- of the two toothed belt sprockets to 25 Nm.
- Remove locking pins - 3359- and crankshaft arrester - T10050- or crankshaft arrester - T10100 - .

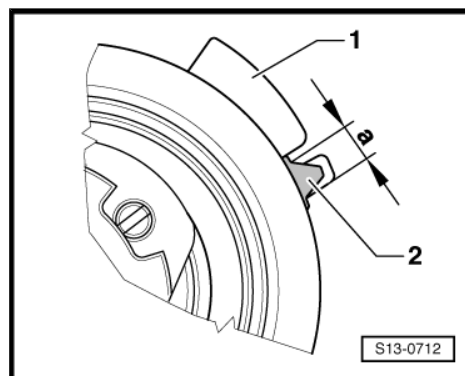


Test timing:

- Turn crankshaft 2 turns in the direction of engine rotation until the crankshaft is positioned before TDC for cylinder 1 again.
- Lock hub -A- from the rotation direction with locking pin - 3359- .
- Check whether:

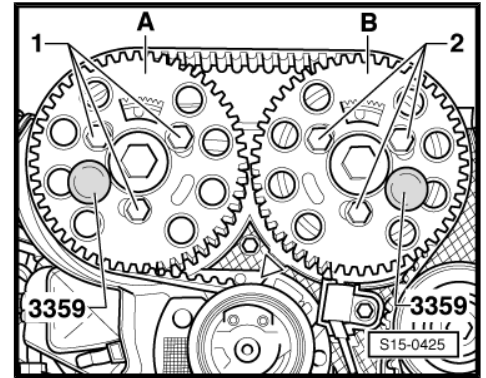


- ♦ The hub -B- can be locked with locking pin - 3359- ;
- ♦ The crankshaft can be locked with crankshaft arrester - T10050 - or crankshaft arrester - T10100- .
- ♦ The pointer of the tensioning pulley -2- must be in area -a- of the base plate -1-.



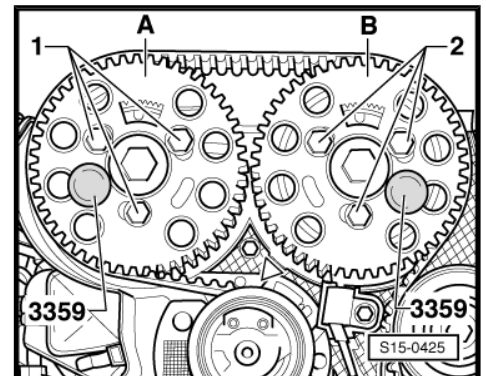
If the hub -B- cannot be locked:

- Loosen the fixing screws -2- for the intake camshaft toothed belt sprocket -B-.
- Place a ring spanner on the central screw for the intake camshaft.
- Turn the hub until the locking pin - 3359- can be inserted.
- Tighten screws -2- for the intake camshaft toothed belt sprocket -B- to 25 Nm.
- Remove locking pins - 3359- and crankshaft arrester - T10050- or crankshaft arrester - T10100 - .
- Rotate the crankshaft 2 turns in the direction of running of the engine until the crankshaft is positioned again on TDC for cylinder 1.
- Repeat timing test ➔ [page 36](#) .



If the crankshaft cannot be arrested:

- Loosen the screws -1- and -2- for the toothed belt sprockets -A- and -B-.

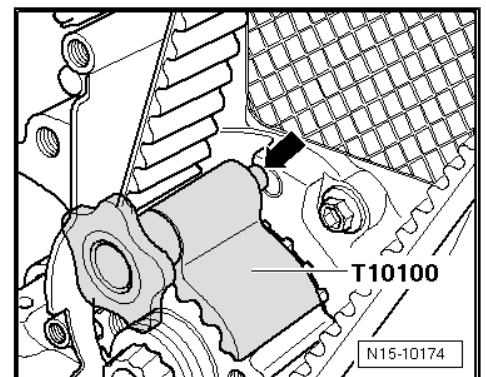


- Rotate the crankshaft in the direction of engine rotation until the crankshaft can be locked with the crankshaft arrester .

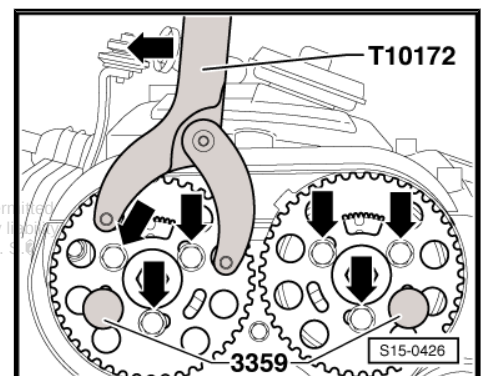


Note

- ◆ *The stud -arrow- must latch into the bore on the sealing flange.*
- ◆ *If the crankshaft has turned behind the TDC for cylinder 1, turn crankshaft back slightly and once again set to the TDC for cylinder 1 by turning in direction of rotation of engine.*



- Insert counterholder - T10172- with bolts - T10172/4- as shown and press in -direction of arrow-.



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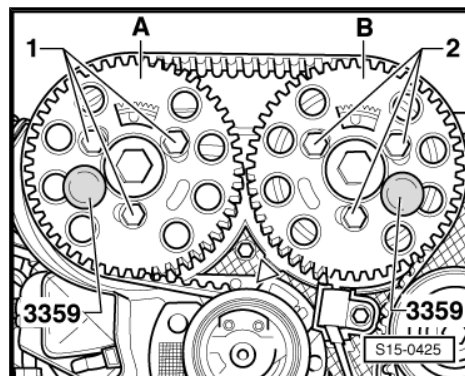


- Keep toothed belt sprockets pre-tensioned using counterholder - T10172- and tighten screws -1- and -2- for toothed belt sprockets -A- and -B- to 25 Nm.
- Remove locking pins - 3359- and crankshaft arrester - T10050- or crankshaft arrester - T10100 - .
- Rotate the crankshaft 2 turns in the direction of running of the engine until the crankshaft is positioned again on TDC for cylinder 1.
- Repeat timing test ➔ [page 36](#) .

Further installation

Further installation occurs in reverse order to removal. Pay attention to the following:

- ♦ Follow installation instructions for installing hose connections with quick couplings ➔ [page 198](#) .



1.3 Removing and installing toothed belt for engines with code BMM

1 - 10 Nm + torque a further 90° (1/4 turn)

- ☐ replace

2 - Belt pulley - crankshaft

- ☐ with vibration damper
- ☐ with notch, which marks the TDC for cylinder 1
- ☐ Adjust TDC for cylinder 1 with vibration damper installed ➔ [page 40](#)

3 - Bottom toothed belt guard

- ☐ with notch, which marks the TDC for cylinder 1

4 - 10 Nm

- ☐ insert using locking agent - D 000 600 A2-

5 - Middle toothed belt guard

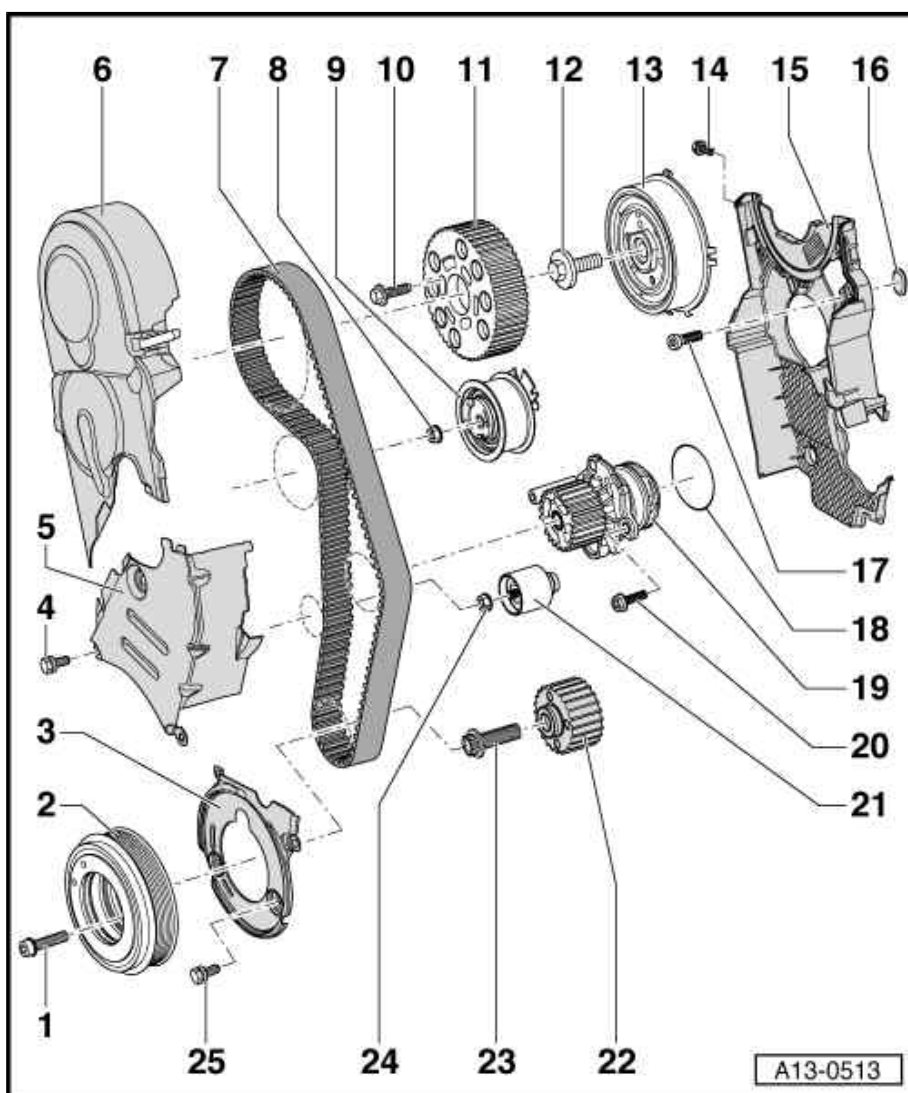
- ☐ with arrow indicating the TDC for cylinder 1
- ☐ Adjust TDC for cylinder 1 with vibration damper installed ➔ [page 40](#)
- ☐ to remove, remove top toothed belt guard and unscrew tensioning device for ribbed V-belt.

6 - Top toothed belt guard

- ☐ to remove, remove the right charge air pipe
- ☐ when installing, carefully insert into the middle toothed belt guard

7 - Toothed belt

- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ check for wear
- ☐ Removing ➔ [page 41](#)



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- ☐ install (set the timing) ⇒ [page 45](#)

8 - 20 Nm + torque a further 45° (1/8 turn)

9 - Tensioning pulley

- ☐ The eccentric of the new version has an additional hole for 6 mm hexagon socket wrench ⇒ [page 40](#)

10 - 25 Nm

11 - Camshaft toothed belt pulley

- ☐ Mark installation position

12 - 100 Nm

- ☐ to release and tighten use counterholder - T10051 -

13 - Hub

- ☐ with sensor rotor for Hall sensor - G40-
- ☐ to release and tighten use counterholder - T10051 -
- ☐ to remove use extractor - T10052-
- ☐ Removing and installing ⇒ [page 113](#)

14 - 10 Nm

- ☐ insert using locking agent - D 000 600 A2-

15 - Rear toothed belt guard

- ☐ to remove, unscrew coolant pump
- ☐ When installing, carefully insert into the front sealing flange - pulley side

16 - Rubber bowl

- ☐ Replace if damaged.

17 - 25 Nm

18 - O-ring

- ☐ replace

19 - Coolant pump

- ☐ Removing and installing ⇒ [page 147](#)

20 - 13 Nm

21 - Guide pulley

22 - Crankshaft toothed belt sprocket

- ☐ there must not be any oil present on the contact surface between the pulley and the crankshaft
- ☐ can be installed only in one position

23 - 120 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ do not oil
- ☐ to release and tighten use counterholder - T30004 - or counterholder - MP 1-310 (3099)-

24 - 20 Nm

- ☐ self-locking, replace

25 - 10 Nm

- ☐ insert using locking agent - D 000 600 A2-

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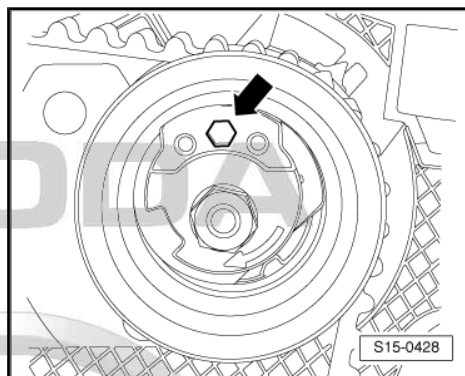
Tensioning pulley

Additional hole in the eccentric of the tensioning pulley for 6 mm hexagon socket wrench -arrow-.



Note

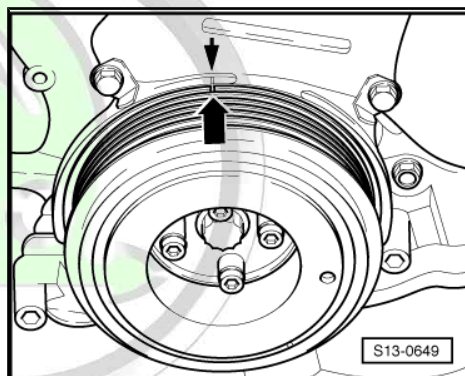
The tensioner pulley of the new version can be adjusted with the special two-hole nut turner, e. g. -T10020-, or using a commercially available 6 mm hexagon socket wrench.



Adjust TDC for cylinder 1 with vibration damper installed

- Turn the crankshaft in the direction of engine rotation at the central screw so that the notch on the vibration damper (TDC marking for cylinder 1) -large arrow- is in line with the embossed arrow -small arrow- on the middle toothed belt guard as shown.

Use the mirror to do this.



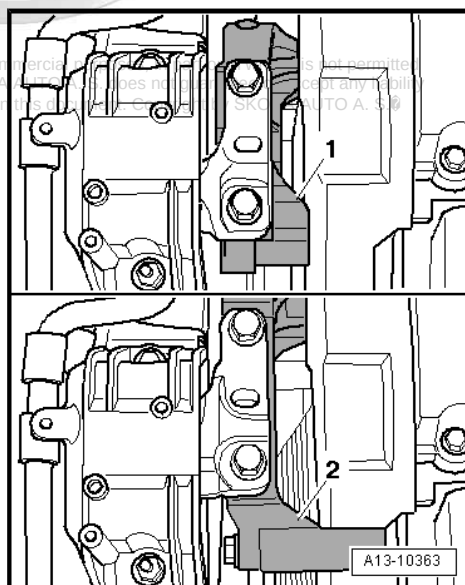
Engine support bracket

On vehicles manufactured from 03.07, the engine support -1- is in-built.



Note

When removing the toothed belt, it is necessary to remove the motor support -1-.



Tightening order for engine support



Caution

The tightening sequence and the tightening torque of the fixing screws for the engine support must definitely be respected. Otherwise stress of the engine support bracket occurs, which results in the breaking of the engine support bracket.

1. Screw in screws -1...3- by hand first.
2. Then tighten the screws to 40 Nm in the sequence -1...3-.
3. Then tighten the screws a further 180° (1/2 turn) in the sequence -1 ... 3-.

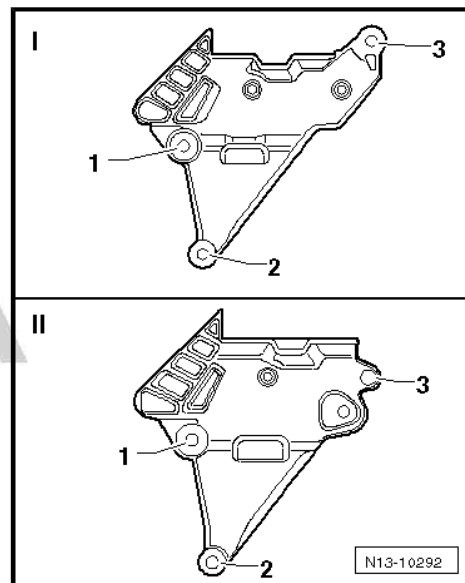


Note

- ◆ To do so, lift or lower the engine with the supporting device - T30099 -.
- ◆ Before the engine mount is installed, all the screws of the engine support must be tightened to the specified tightening torque.

I: engine mount for vehicles up until 02.2007

II: engine mount for vehicles from 03.2007



1.3.1 Removing toothed belt

Special tools and workshop equipment required

- ◆ Supporting device - T30099 -
- ◆ Surface - T30099/1 -
- ◆ Hook - MP 9-200/10 (10-222A/10) -
- ◆ Locking pin - 3359- or -MP 1-301 -
- ◆ Locking pin - T10060- or -T10060A -
- ◆ Crankshaft arrester - T10050- or crankshaft arrester - T10100-
- ◆ Pressure pad - T10172 - with stud - T10172/4-
- ◆ Offset screwdriver - T10264-
- ◆ Rig tool - T10265-
- ◆ Pliers for spring-type clips
- ◆ Locking agent - D 000 600 A2-



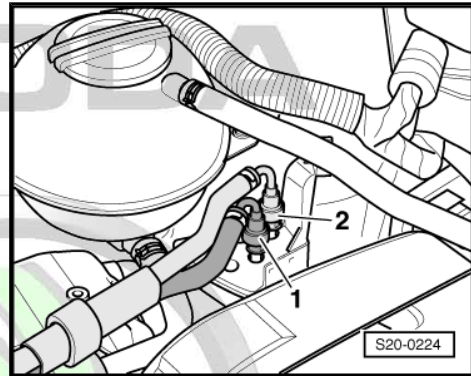
Note

Mark the direction of rotation with chalk or a felt-tip pen before removing the V-ribbed belt. Reversing the rotation direction of an already used belt may destroy it.

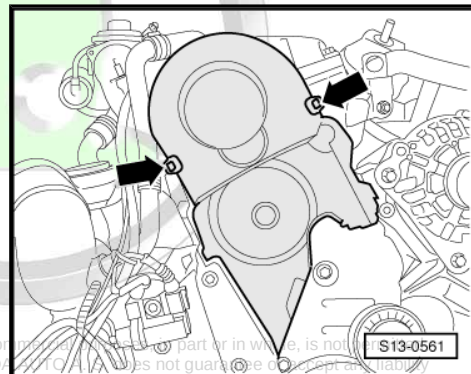
- Remove V-ribbed belt ➔ [page 23](#) .
- Remove charge air pipe for intake manifold flap motor - V157- .
- Safety instructions when working on the injection system ➔ [page 3](#) .



- Detach fuel feed line -2- and fuel return-flow line -1-, to do so press in securing ring.



- Remove top toothed belt guard, to do so release retaining clips -arrows-.
- Remove ribbed V-belt tensioning device.
- Remove bottom part of right wheelhouse liner ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove crankshaft belt pulley.
- Unscrew bottom and middle toothed belt guard.



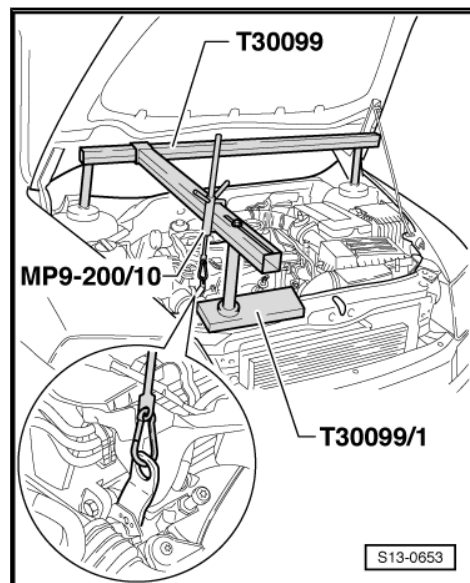
Vehicles as of 03.07

- Remove the cooling water tank cover ⇒ Body Work ⇒ Rep. gr. 66 .
- Fit supporting device - T30099- and base - T30099/1 - , suspend engine/gearbox assembly from the right lifting eye with hooks - MP 9-200/10 - and pre-load using spindles, but do not raise.

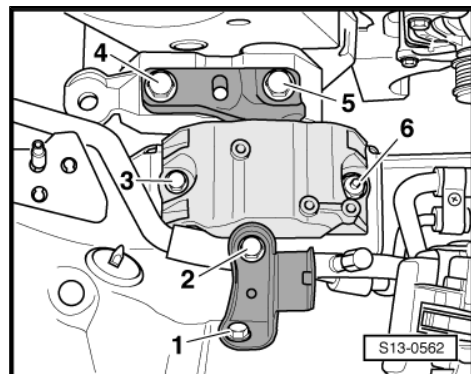


Note

If the cylinder head needs to be removed, two spindles must be attached at the supporting device - T30099- ⇒ [page 85](#) .



- Release screws -1- and -2- and remove connecting stud.
- Release screws -3...6- and remove engine mounting.



- Release screws -1 ... 3- for engine support and remove support.

i Note

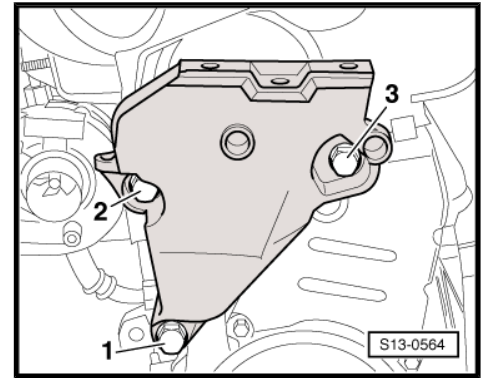
To release the screws for the engine support, raise or lower engine slightly via the spindle of supporting device - T30099- .

Continued for all vehicles

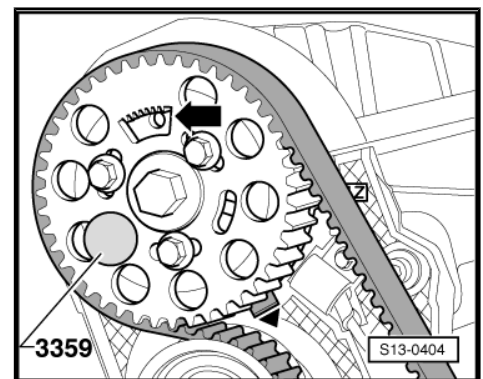


Caution

The engine may only be turned in the direction of engine rotation (clockwise) at the crankshaft.



- Rotate crankshaft to TDC for cylinder 1.
 - The gear segment -arrow- must point upwards.
- Lock hub with locking pin - 3359- .

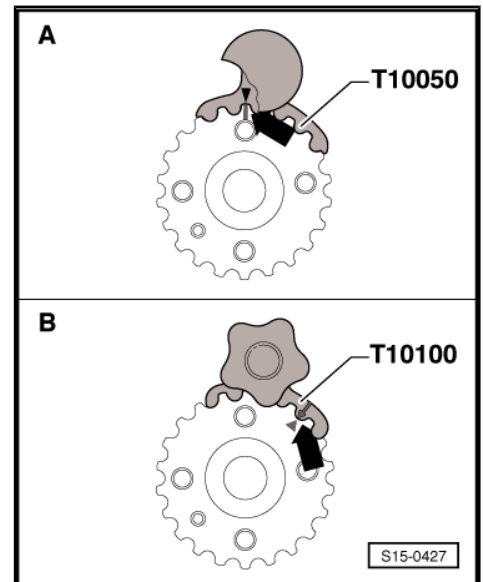


- Depending on the version, lock the crankshaft toothed belt sprocket using the crankshaft arrester - T10050- or crankshaft arrester - T10100- .

Distinguishing the crankshaft toothed belt sprocket:

A = original version of toothed belt sprocket with circular tooth flanks, rectangular TDC marking on tooth in 12 o'clock position for cylinder 1 - use crankshaft arrester - T10050 -

B = new version of toothed belt sprocket with elliptical tooth flanks, triangular TDC marking on the gap in the sprocket in 1 o'clock position - use crankshaft arrester - T10100-



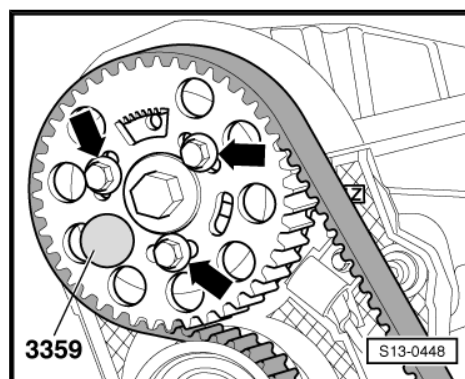
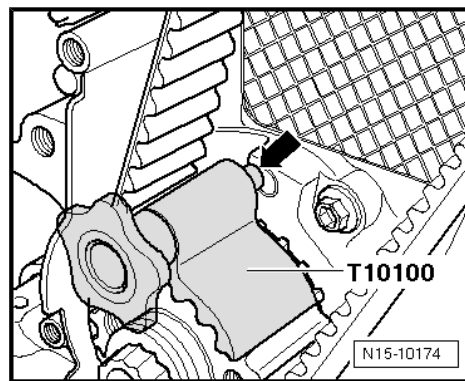


Note

- ◆ *Markings on the toothed belt sprocket and on the crankshaft arrester must be in line with each other -arrow-.*
- ◆ *The pin on the crankshaft arrester -arrow- must engage into the hole in the sealing flange.*
- ◆ *The crankshaft arrester can only be fitted onto the toothed belt sprocket from the front side of the serration.*

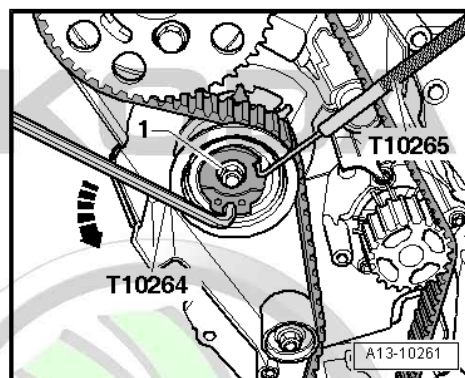
– Mark the direction of rotation of the toothed belt with chalk or a felt-tip pen.

– Loosen screws -arrows- for toothed belt sprocket by approx. 1 turn.



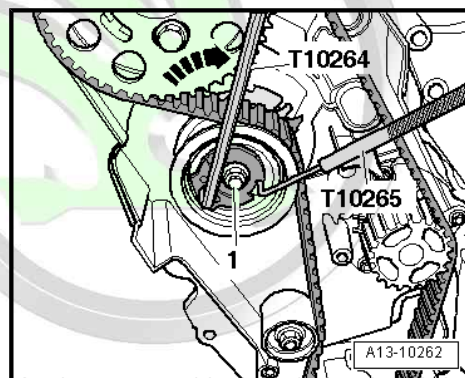
– Loosen the fixing nut -1- of the tensioning pulley.

– Turn the eccentric of the tensioning pulley with the offset screwdriver - T10264- in anti-clockwise direction -arrow- until the tensioning pulley can be interlocked with the rig tool - T10265 -.



– Now turn eccentric of the tensioning pulley clockwise -arrow- as far as the stop and tighten fixing nut -1- by hand.

– Firstly remove toothed belt from coolant pump toothed belt sprocket and then from the other toothed belt sprockets.



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1.3.2 Installing toothed belt (adjusting timings):



Caution

The following work sequence must be followed precisely.

- ◆ *If a final test is omitted, for example, and the pins are not reinserted, there is a risk that the timing will not be set correctly and the vehicle will have poor driving performance and uneven idling.*

- Camshaft is locked with locking pin e.g. - 3359- .
- Crankshaft is locked with crankshaft arrester - T10050- or crankshaft arrester - T10100- .
- Tensioning pulley is locked with rig pin - T10265- and fixed with fixing nut to the right stop.



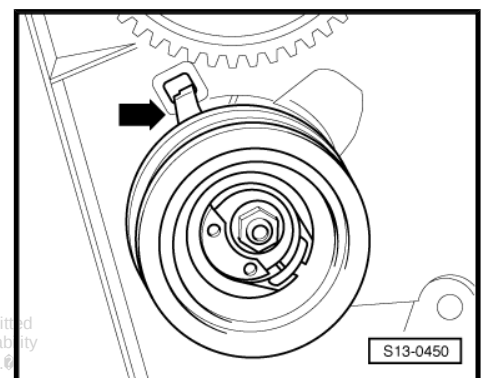
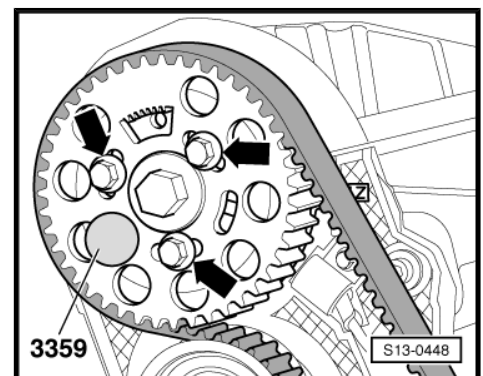
Note

- ◆ *Only ever perform adjustment work on the toothed belt on a cold engine.*
- ◆ *When rotating the camshaft, the crankshaft must not be positioned at TDC for any one piston. Risk of damaging valves and pistons.*

- Slightly screw in screws -arrows-.
- It must still be possible to turn the toothed belt sprocket on the hub, but it must not tilt.
- Turn toothed belt sprocket clockwise in the elongated holes as far as the stop.
- Fit toothed belt onto crankshaft toothed belt sprocket, tensioning pulley, camshaft and, last of all, onto the toothed belt sprocket of the coolant pump.

Set the tension of the timing belt as follows:

- Loosen the fastening nut of the tensioning pulley and remove the rig pin - T10265- from the tensioning pulley.
- Check the correct fitting of the tensioning pulley in the hole in the rear timing belt guard -arrow-.



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- Turn the eccentric of the tensioning pulley with offset screwdriver - T10264- clockwise -arrow- in such a way until the pointer -2- stands in the centre of the base plate in the gap.



Note

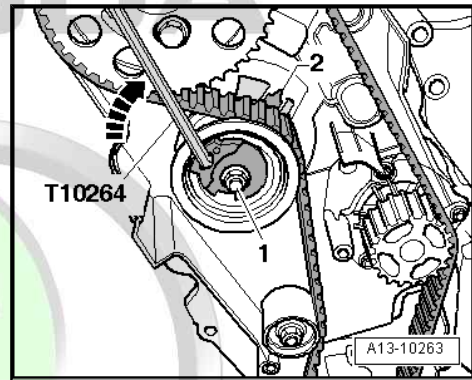
Ensure that the fixing nut does not turn.

- Hold the eccentric of the tensioning pulley in this position and tighten the fixing nut to 20 Nm plus a further 45° (1/8 turn).



Note

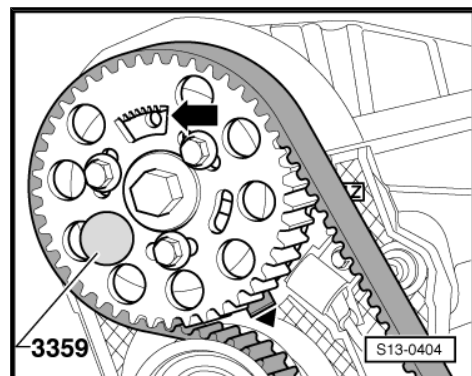
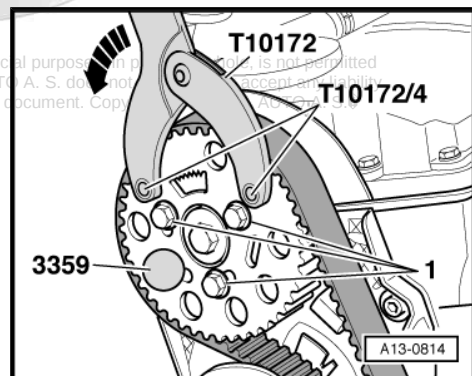
When tightening the fixing nut, the pointer -arrow- turns max. 5 mm to the right from the gap of the base plate. This position must not be corrected, because the toothed belt settles when running-in.



- Insert counterholder - T10172- with bolt - T10172/4- as shown in the illustration and by pressing in the -direction of arrow- hold the tension of the timing belt on the tension side.
- Tighten securing bolts -1- to 25 Nm.
- Remove locking pin - 3359- and crankshaft arrester - T10050- or crankshaft arrester - T10100 - .

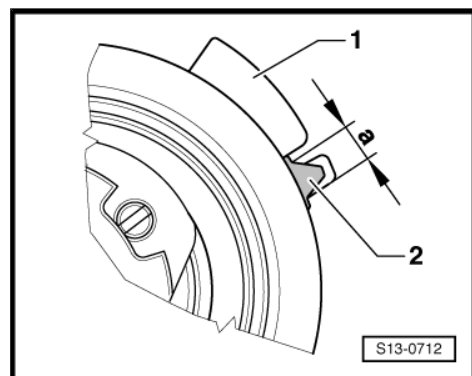
Checking valve timing

- Turn crankshaft 2 turns in the direction of running of the engine until the crankshaft is positioned shortly before TDC for cylinder 1.
- Interlock during this motion the hub in the direction of running of the engine with locking pin - 3359- .
- Check whether:

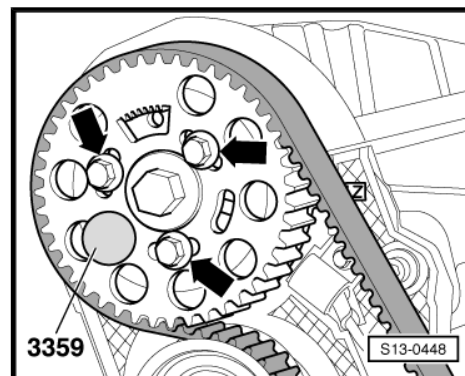


- ♦ The crankshaft can be locked with crankshaft arrester - T10050- or crankshaft arrester - T10100- .
- ♦ The pointer of the tensioning pulley -2- must be in area -a- of the base plate -1-.

If the crankshaft cannot be arrested:



- Loosen screws -arrows- for toothed belt sprocket.

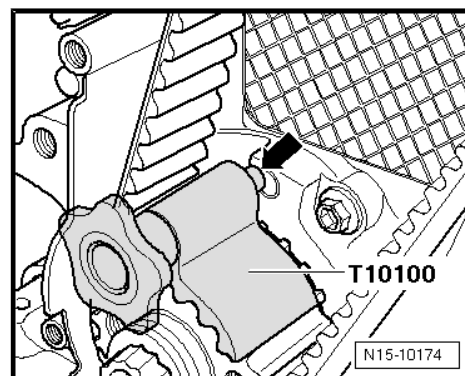


- Rotate crankshaft in direction of engine rotation until the crankshaft can be locked in the hole in the sealing flange -arrow- with the crankshaft arrester .

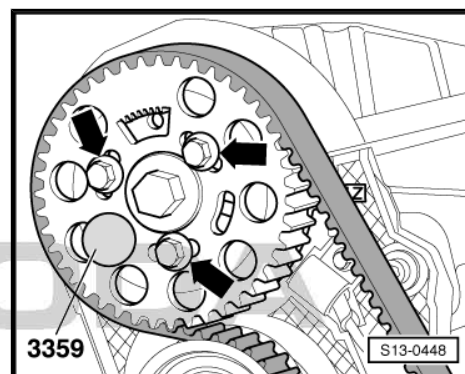


Note

- ◆ The stud -arrow- must latch into the bore on the sealing flange.
- ◆ If the crankshaft has turned behind the TDC for cylinder 1, turn crankshaft back slightly and once again set to the TDC for cylinder 1 by turning in direction of rotation of engine.



- Tighten fixing screws -arrows- to 25 Nm.
- Remove locking pin - 3359- and crankshaft arrester - T10050- or crankshaft arrester - T10100 - .
- Rotate the crankshaft 2 turns in the direction of running of the engine until the crankshaft is positioned again on TDC for cylinder 1.
- Repeat timing test ➤ [page 46](#) .



Further installation

Further installation occurs in reverse order to removal.





2 Removing and installing sealing flange and flywheel



Note

Repairs to the clutch ➔ gearbox ➔ Rep. gr. 30 .

1 - Sealing ring

- ☐ Replace ➔ [page 49](#)
- ☐ do not oil or grease

2 - Sealing flange on the belt pulley side

- ☐ must be positioned on dowel sleeves
- ☐ Removing and installing ➔ [page 51](#)

3 - Cylinder block

4 - Dual-mass flywheel

- ☐ Removing and installing ➔ [page 59](#)
- ☐ assembly is only possible in one position through offset holes

5 - 60 Nm + torque a further 90° (1/4 turn)

- ☐ replace

6 - Intermediate plate

- ☐ must be positioned on dowel sleeves
- ☐ do not damage/bend during assembly work
- ☐ hang on the sealing flange ➔ [page 49](#)

7 - 15 Nm

- ☐ replace

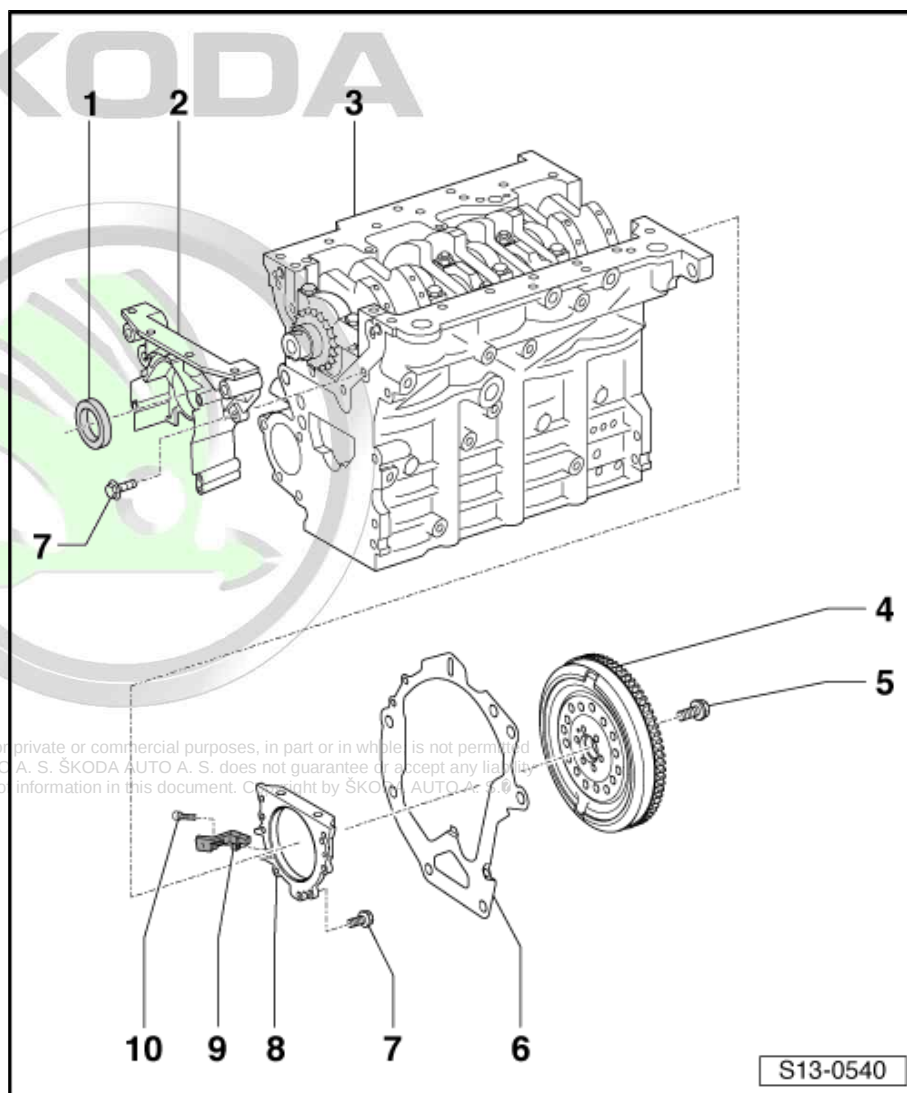
8 - Sealing flange on the gear-box side

- ☐ can only be replaced complete with gasket ring and with rotor of engine speed sender - G28-
- ☐ Replace ➔ [page 53](#)

9 - engine speed sender - G28-

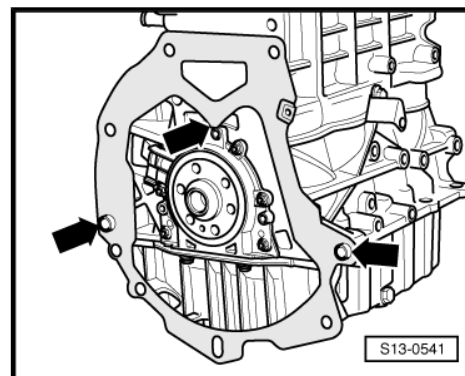
- ☐ Removing and installing ➔ [page 226](#)

10 - 5 Nm



Installing intermediate plate

- Insert intermediate plate on sealing flange and push onto the dowel sleeves -arrows-.



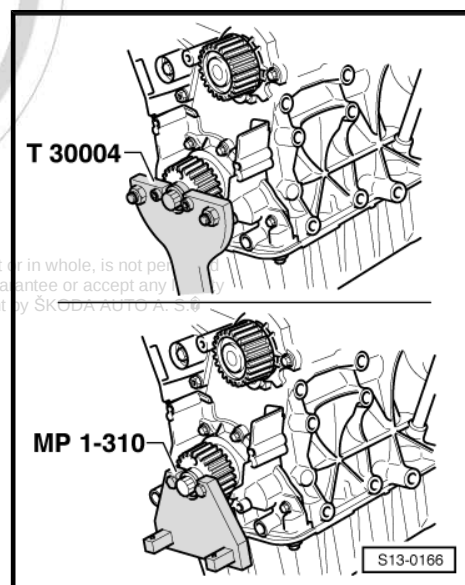
2.1 Replace crankshaft seal on belt pulley side

Special tools and workshop equipment required

- ◆ Counterholder - T30004 - or counterholder for toothed belt sprocket - MP 1-310 (3099)-
- ◆ Sealing ring extractor - MP 1-226 (3203)-
- ◆ Assembly tool - T10053-

Removing

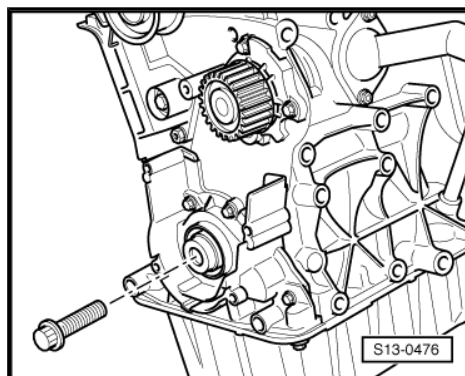
- Engine installed.
- Remove toothed belt.
- ◆ Motor code BKD, AZV: ➔ [page 26](#)
- ◆ Engine code BMM: ➔ [page 38](#)
- Remove the crankshaft toothed belt sprocket; to do so, hold toothed belt sprocket with counterholder - T30004 - or lock with counterholder - MP 1-310- .



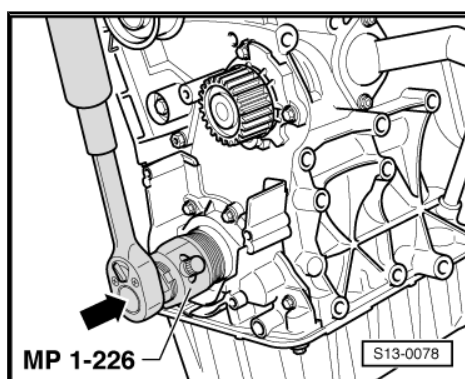
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- To guide the gasket ring extractor screw the central screw for crankshaft - toothed belt sprocket in the crankshaft up to the stop.



- Turn inner part of gasket ring extractor - MP 1-226- two turns (approx. 3 mm) out of the outer part and lock with knurled screw.
- Oil the thread head of the sealing ring extractor, position and fix screw into the sealing ring as far as possible.
- Release knurled screw and turn the inner side against the crankshaft until the gasket ring is pulled out.
- Clamp gasket ring extractor into the vice and remove gasket ring with pliers.
- Clean the contact and sealing surfaces.



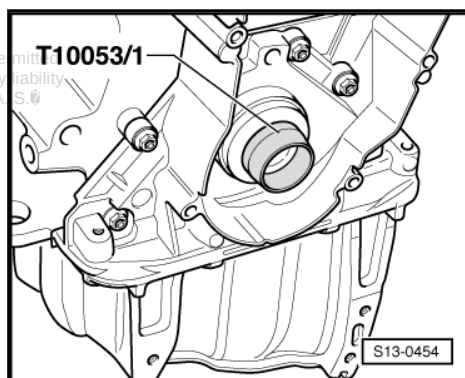
Installing



Note

Do not oil the sealing lip and the outer surface of the gasket ring before the pressing in procedure.

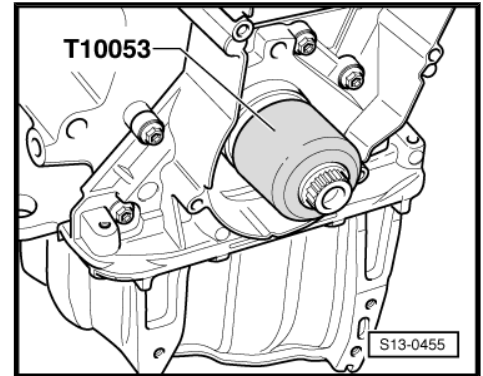
- Remove oil residue on the crankshaft journal with a clean cloth.
- Insert guide bushing - T10053/1- on the crankshaft bearing pin.
- Slide gasket ring over the guide bushing.



- Press in the gasket ring flush with the central screw for the toothed belt sprocket of the crankshaft and with the pressure bushing of the assembly device - T10053- .

i Note

- ◆ *There must not be any oil present on the contact surface between toothed belt sprocket and crankshaft.*
 - ◆ *Replace central screw for crankshaft toothed belt sprocket.*
 - ◆ *Do not oil the central screw for crankshaft toothed belt sprocket.*
- Remove the crankshaft toothed belt sprocket; to do so, hold toothed belt sprocket with counterholder - T30004 - or lock with counterholder - MP 1-310 (3099)- .
 - Installing the timing belt.
 - ◆ Motor code BKD, AZV: ➔ [page 26](#)
 - ◆ Engine code BMM: ➔ [page 38](#)



2.2 Removing and installing the sealing flange on the belt pulley side

Special tools and workshop equipment required

- ◆ Counterholder - T30004 - or counterholder for toothed belt sprocket - MP 1-310 (3099)-
- ◆ Assembly tool - T10053-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Protective goggles and gloves
- ◆ Cleaning and degreasing agent , e.g. - D 000 401 04-
- ◆ Silicone sealant - D 176 404 A2-

Removing

- Engine installed.
- Remove toothed belt.
- ◆ Motor code BKD, AZV: ➔ [page 26](#)
- ◆ Engine code BMM: ➔ [page 38](#)



- Remove the crankshaft toothed belt sprocket; to do so, hold toothed belt sprocket with counterholder - T30004 - or lock with counterholder - MP 1-310- .
- Drain engine oil ⇒ Maintenance ; Booklet Octavia II .
- Removing the oil pan ⇒ [page 125](#) .
- Unscrew the fixing screws of the front sealing flange and remove sealing flange, if necessary release by applying slight blows with a rubber-headed hammer.
- Drive out the gasket ring from the removed sealing flange.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:



WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

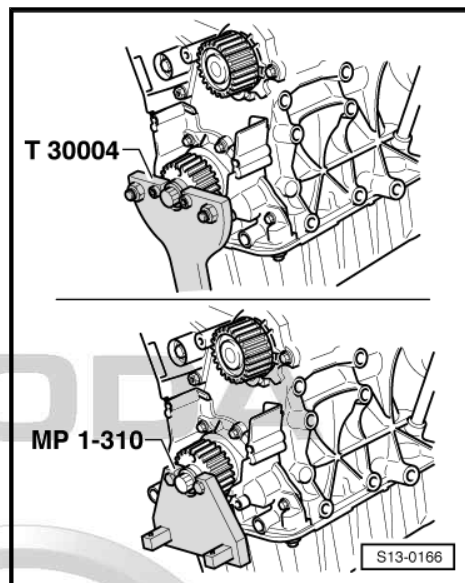
- Use chemical sealant remover to remove any sealant residues from sealing surfaces on sealing flange, cylinder block and oil pan.
- Degrease the sealing surfaces.



Note

Pay attention to the use by date on the silicone sealant.

- Cut off nozzle tube at the front marking (Ø of nozzle approx. 3 mm).



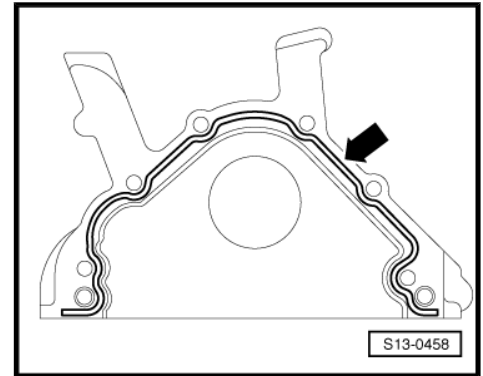
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- Apply silicone sealant bead -arrow- to the clean sealing surface of the upper part of the sealing flange, as shown.
- Thickness of sealant bead -arrow-: 2...3 mm.



Note

- ◆ *The sealant bead must not be thicker than 3 mm otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.*
- ◆ *The sealing flange must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *When installing the sealing flange with the gasket ring fitted place a guide sleeve - T10053/1- on the crankshaft journal.*



- Carefully push the sealing flange onto the dowel sleeves at the cylinder block and tighten new fixing bolts by hand.
- Tighten the screws of the sealing flange alternately and cross-wise to 15 Nm.
- Insert new sealing ring ➔ [page 49](#) .
- Installing the oil pan ➔ [page 125](#) .
- Remove the crankshaft toothed belt sprocket; to do so, hold toothed belt sprocket with counterholder - T30004 - or lock with counterholder - MP 1-310- .
- Installing the timing belt.
- ◆ Motor code BKD, AZV: ➔ [page 26](#)
- ◆ Engine code BMM: ➔ [page 38](#)
- Top up with engine oil and check the oil level ➔ Maintenance ; Booklet Octavia II .

2.3 Replace sealing flange on the gearbox side

Special tools and workshop equipment required

- ◆ Assembly tool - T10134-
- ◆ Screw M6 x 35 (3x)
- ◆ Screw M7 x 35 (2x)
- ◆ Feeler gauges
- ◆ Steel straightedge

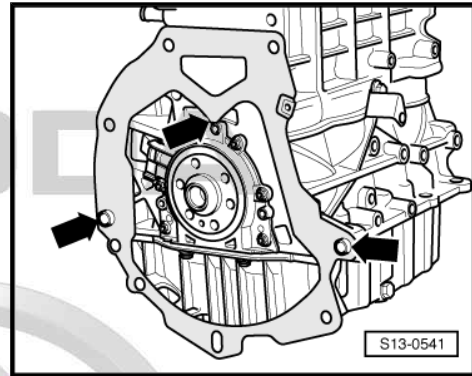
2.3.1 Removing

- Gearbox removed.
- Remove the two-mass flywheel ➔ [page 59](#) .

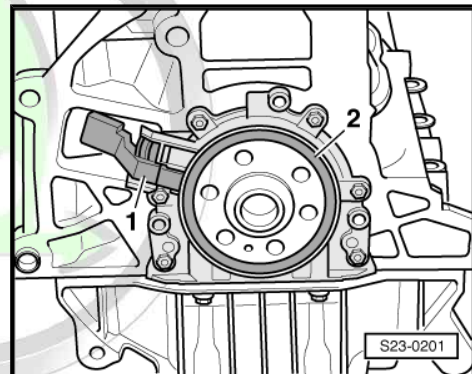
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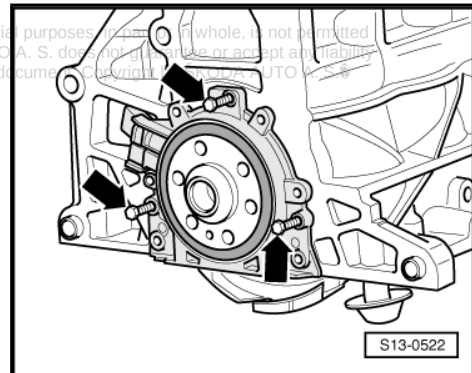
- Remove the intermediate plate from the dowel sleeves and unhook from sealing flange -arrows-.
- Position crankshaft to TDC for cylinder 1 ⇒ [page 29](#) .
- Removing the oil pan ⇒ [page 125](#) .



- Remove engine speed sender - G28- -1-.
- Unscrew fixing screws of the rear sealing flange.



- Screw 3 screws M6 x 35 mm into the threaded bores of the sealing flange -arrows-.
- Press out sealing flange together with rotor from the crankshaft by alternately screwing the screws into the sealing flange.



2.3.2 Installing

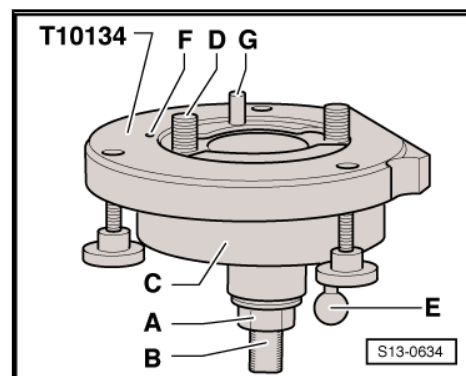


Note

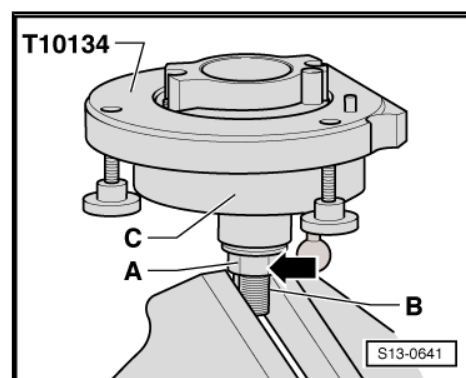
- ♦ The sealing flange with a PTFE seal is equipped with a sealing lip support ring. This support ring serves as a fitting sleeve and must not be removed prior to installation.
- ♦ Do not separate or turn the sealing flange and rotor after removing them from the spare part package.
- ♦ The rotor gets its fitting location by fixing by fixing to the positioning pin of the assembly tool - T10134- .
- ♦ Sealing flange and sealing ring form one unit and must only be renewed together with the transmitter wheel.
- ♦ The rotor has an elastomer layer on its sealing surface with the crankshaft. This layer must not be brought into contact with dirt or grease.
- ♦ The assembly tool - T10134- is given its fitting location to the crankshaft by means of a guide bolt, which is guided into the threaded bore of the crankshaft.

A - Mounting sealing flange with rotor on the assembly tool - T10134-

- A - Hexagon nut
- B - Clamping surface
- C - Assembly cup
- D - Allan screw
- E - Guide bolts (with red handle - for fuel engine)
- F - Positioning pin
- G - Guide bolts (with black handle - for diesel engine)



- Grip the assembly tool - T10134- on the clamping surface -B- of the threaded spindle in a vice.

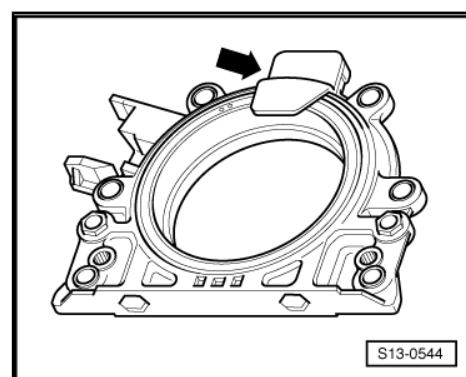


- Remove securing clip -arrow- from new sealing flange.

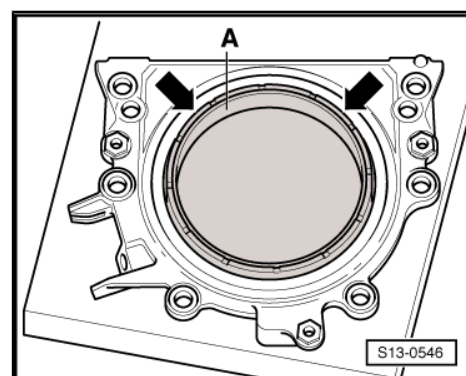


Note

Do not remove the rotor from the sealing flange or turn it.

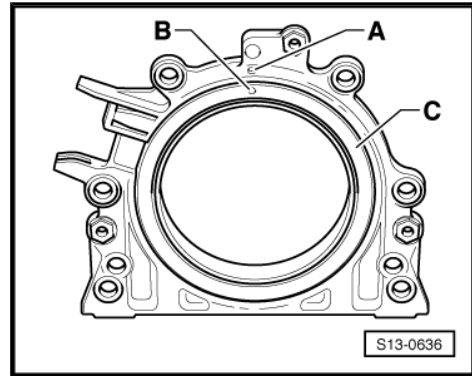


- Place sealing flange with front side facing down on a clean level surface.
- Press the sealing lip supporting ring -A- -arrows-, until it rests on the level surface.
- The top edge of the rotor and the front edge of the sealing flange must be flush.





The locating hole -B- on the rotor -C- must be flush with the marking -A- on the sealing flange.

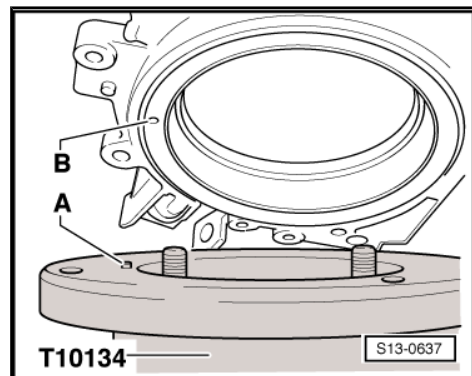


- Lay the sealing flange with the front side on the assembly tool - T10134- in such a way that the positioning pin -A- engages into the hole -B- of the rotor.



Note

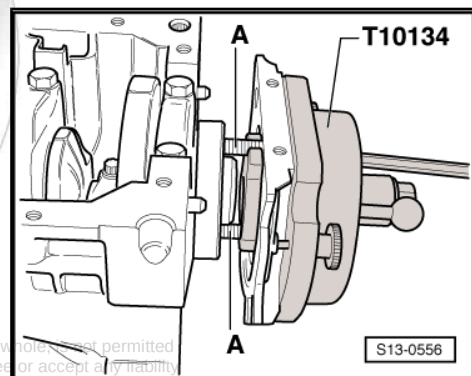
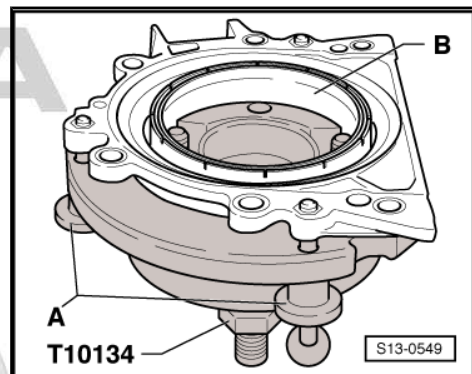
Make sure the sealing flange lies flat on the assembly device.



- When tightening the knurled screws -A- press the sealing lip supporting ring -B- on the surface of the assembly tool - T10134- in such a way that the positioning pin can no longer slide out of the rotor hole.

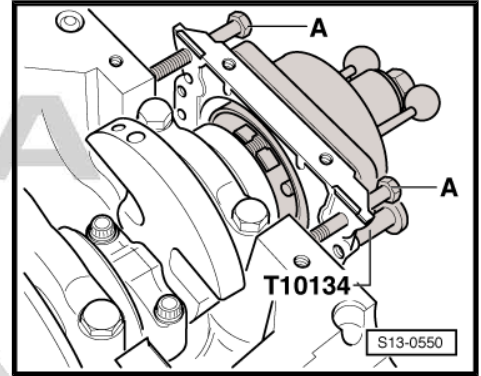
B - Mounting the assembly tool - T10134- with sealing flange on the crankshaft flange

- The crankshaft flange must be free of grease and oil
- Crankshaft is at TDC for cylinder 1
- Unscrew hexagon nut up to the end of the threaded spindle.
- Screw assembly tool - T10134- with Allan screws -A- up to the stop onto the crankshaft flange.

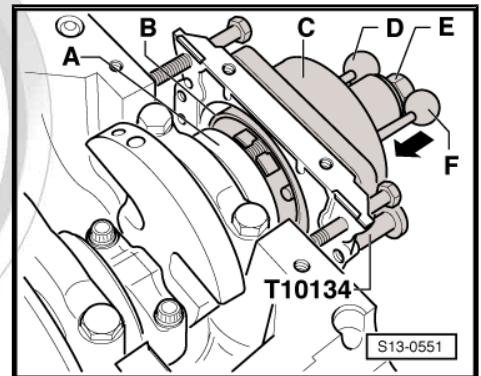


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- Screw in two screws M7 x 35 mm -A- by about 3 thread turns for the sealing flange guide into the cylinder block.



- Move the assembly cup -C- by hand in the -direction of the arrow- until the rotor -B- rests on the crankshaft flange -A-. Subsequently insert the guide bolt with black ball -D- fully into the threaded bore of the crankshaft. If the guide bolt is correctly pushed in, then the handle has a distance of approx. 10 mm from the assembly cup -C-. This gives the rotor its final installation position.
- Screw in hexagon nut -E- by hand onto the threaded spindle until it rests against the assembly cup -C-.



i Note

The guide bolt for petrol engines (red handle) -F- must not be fitted into the threaded hole of the crankshaft.

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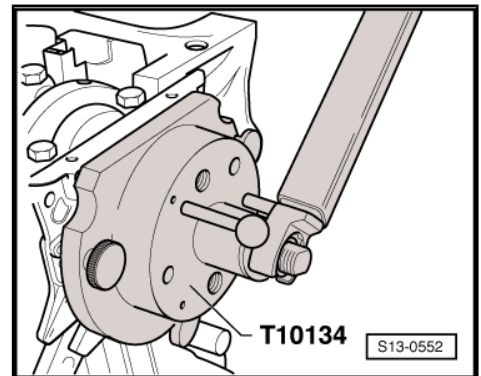
C - Pressing the rotor onto the crankshaft flange

- Tighten the hexagon nut of the assembly tool - T10134 - using a torque wrench with adapter. Tightening torque: 35 Nm.

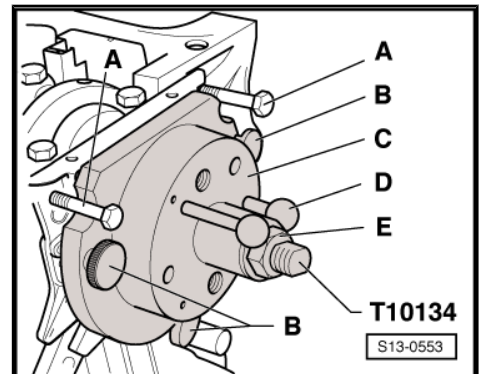
i Note

After tightening the nut to 35 mm there must still be a narrow air gap between the cylinder block and the sealing flange.

D - Inspect the fitting position of the rotor on the crankshaft

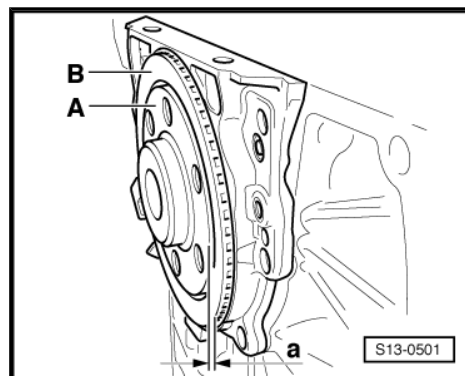


- Unscrew hexagon nut -E- up to the end of the threaded spindle.
- Release both screws -A- to the guide from the cylinder block.
- Unscrew three knurled screws -B- from the sealing flange.
- Unscrew two Allan screws and remove assembly device.
- Remove sealing lip support ring.





The fitting position of the rotor on the crankshaft is accurate if there is a distance -a- of 0.5 mm between the crankshaft flange -A- and the rotor -B-.



- Position the steel straight edge onto the crankshaft flange.
- Measure the distance between the steel straightedge and the rotor with a feeler gauge.

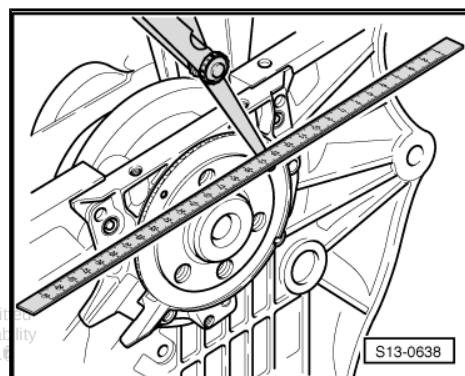
If the measured distance is less than 0.5 mm:

- Press down rotor ➔ [page 58](#) .

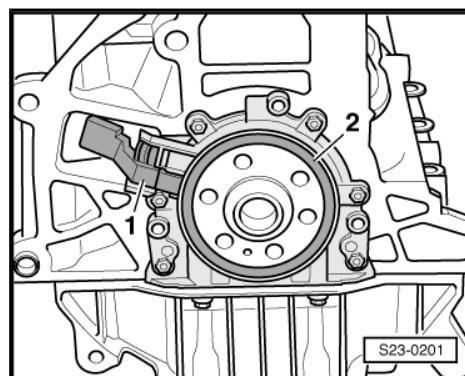
If the dimension is correct:

- Tighten the new fixing screws of the sealing alternately cross-wise.

Tightening torque: 15 Nm.

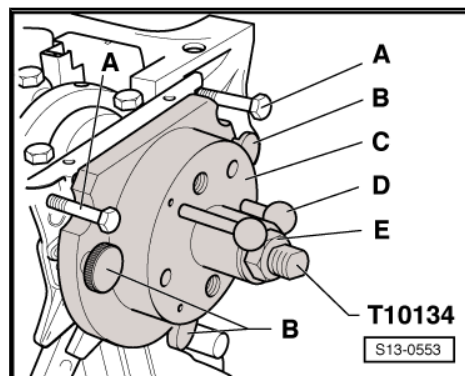


- Install engine speed sender - G28- -1-. Tightening torque: 5 Nm.
- Installing the oil pan ➔ [page 125](#) .
- Installing intermediate plate.
- Install flywheel with new screws. Tighten fixing bolts to 60 Nm and torque a further 1/4 turn (90°).



E - Pressing down the rotor

- Screw assembly tool - T 10134- with Allan screws up to the stop onto the crankshaft flange.
- Screw in three knurled screws -B- into the flange.
- Subsequently insert the guide bolt with black ball -D- fully into the threaded bore of the crankshaft. If the guide bolt is correctly positioned, then the handle has a distance of approx. 10 mm from the assembly cup -C-.
- Screw in hexagon nut -E- by hand onto the threaded spindle until it rests against the assembly cup.



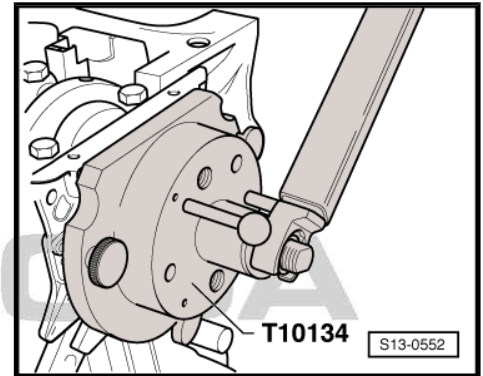
- Tighten the hexagon nut of the assembly tool using a torque wrench with adapter.

Tightening torque: 40 Nm.

- Check the fitting position of the rotor on the crankshaft again
⇒ [page 57](#) .

If the dimension -a- is too small again:

- Tighten the hexagon nut of the assembly device to 45 Nm.
- Check the fitting position of the rotor on the crankshaft again
⇒ [page 57](#) .



2.4 Removing and installing the two-mass flywheel

Special tools and workshop equipment required

- ◆ Counterholder - MP1-223 (3067)-

or

- ◆ Engine mount - MP 1-202 (VW 540)-
- ◆ Bushing - T30010 (VW 540/1B)-
- ◆ Flywheel lock - MP 1-504-

Removing

- Gearbox removed.

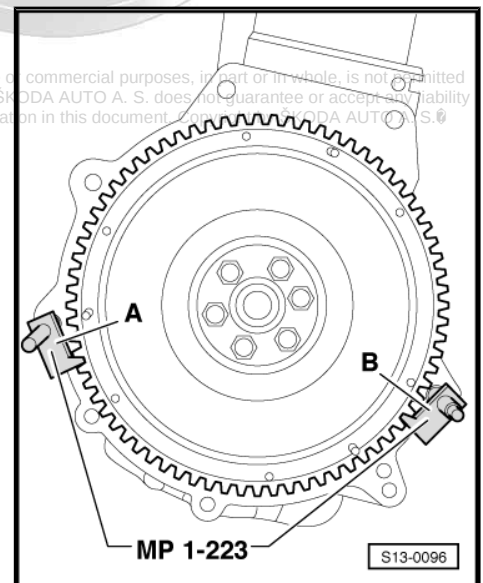
Engine installed

- Insert the counterholder - MP1-223 (3067)- into the bore hole on the cylinder block.

- Fitting position of the tool:

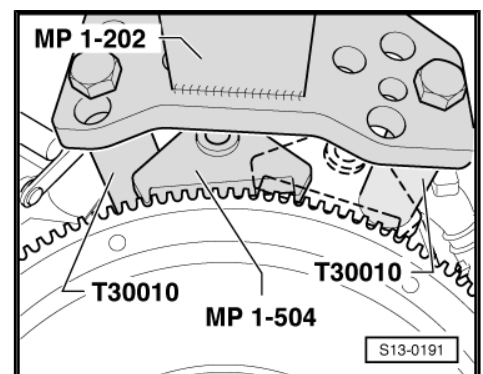
A - for tightening

B - for slackening



Engine removed

- Position the flywheel lock - MP 1-504- on the starter ring gear and turn crankshaft until it rests against the sleeve - T30010- .





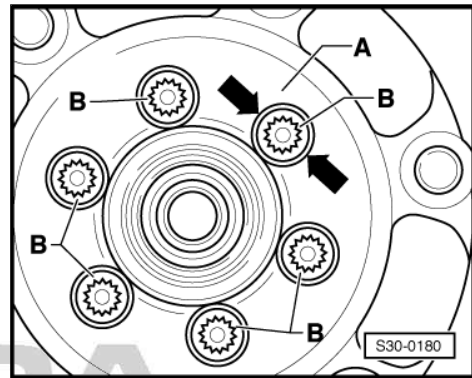
Continued for all

- Rotate the secondary side -A- of the two-mass flywheel in such a way that the screws -B- are positioned in the middle of the holes -arrows-.



Caution

When unscrewing the screws -B-, ensure that no screw head catches on the secondary side -A- of the two-mass flywheel, otherwise it will be damaged.



- Release screws -B- and remove two-mass flywheel.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

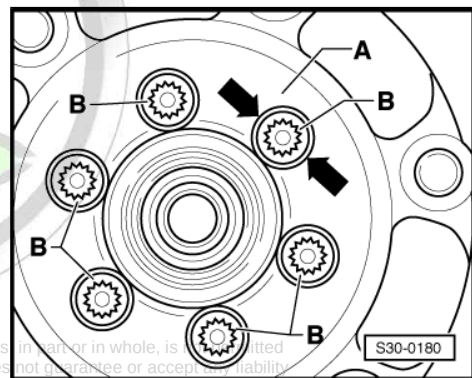


Note

Use new screws for attaching.

- Rotate the secondary side -A- of the two-mass flywheel in such a way that the screws -B- are positioned in the middle of the holes -arrows-.

1. Screw in all the screws -B- by hand.
2. First of all tighten all the screws -B- crosswise to 60 Nm.
3. Then torque all the screws -B- crosswise a further 90° (1/4 turn.)



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3 Crankshaft, Piston and Conrod

3.1 Removing and installing crankshaft



Note

The engine should be attached to the engine repair stand with the engine holder - MP 1-202 (VW 540)- for carrying out removal and installation work.

1 - Bearing shell

- ☐ for cylinder block with lubricating groove
- ☐ do not mix up used bearing shells (mark)

2 - Drive chain sprocket

- ☐ for oil pump
- ☐ Removing and installing
⇒ [page 62](#)

3 - Bearing shell

- ☐ for bearing cap without lubricating groove
- ☐ do not mix up used bearing shells (mark)

4 - Thrust washers

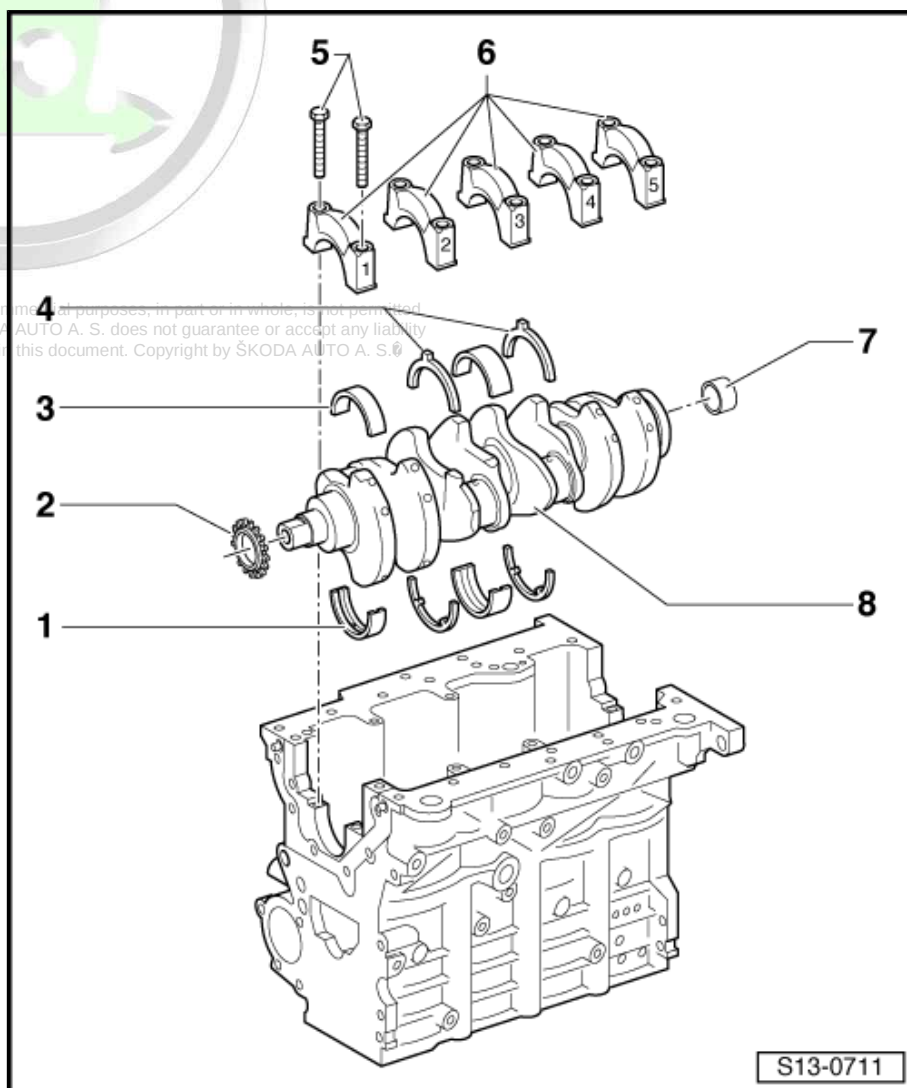
- ☐ for bearing 3
- ☐ different versions for bearing cap and cylinder block
- ☐ pay attention to locating element

5 - 65 Nm + torque a further 90° (1/4 turn)

- ☐ replace

6 - Bearing caps

- ☐ Bearing cap 1: belt pulley side
- ☐ bearing cap 3 with recesses for thrust washers
- ☐ retaining lugs of the bearing shells of the cylinder block/bearing cap must be on top of one another



7 - Needle bearing

- ☐ only vehicles with automatic gearbox
- ☐ Replace ⇒ [page 62](#)

8 - Crankshaft

- ☐ with chain sprocket for oil pump drive
- ☐ Axial play when new: 0.07...0.17 mm, wear limit: 0.37 mm
- ☐ Crankshaft bearing pin: $\varnothing$ 54.00 mm



- ❑ Conrod bearing pin: $\varnothing$ 50.90 mm

3.2 Removing and installing drive chain sprocket

Special tools and workshop equipment required

- ◆ Drive bushing - MP1-316 (30 - 100)-
- ◆ Two-arm extractor, standard commercially available
- ◆ Protective gloves

Removing

- Remove the sealing flange on the belt pulley side
⇒ [page 51](#) .
- Remove chain tensioner, chain and chain sprocket for oil pump.
- Remove drive chain sprocket for crankshaft with two-arm extractor -2-. At the same time protect the crankshaft journal with a suitable washer -1-.

Installing

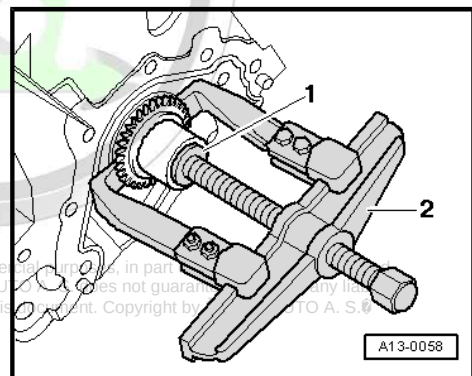
Installation occurs in reverse order to removal. Pay attention to the following:



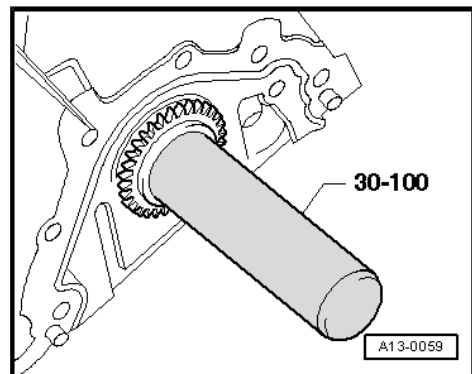
WARNING

Wear protective gloves!

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- Heat up the drive chain sprocket in an oven for about 15 minutes to 220 °C.
- Place the drive chain sprocket on the shaft end using pliers and with bushing - 30 - 100- slide on until the stop on the crankshaft is reached.
- Fitting position: the broader collar of the drive chain sprocket (45° chamfer in the hole) points to the engine.



3.3 Replace needle bearing for crankshaft

Only on vehicles fitted with automatic gearbox.

Special tools and workshop equipment required

- ◆ Interior extractor 14...18 mm , e.g. -Kukko 21/2-
- ◆ Countersupport . e.g. -Kukko 22/1 -
- ◆ Centring mandrel - T30029 (3176)-

Removing

- Remove needle bearing with internal extractor 14 ... 18 mm and countersupport -A-.



Note

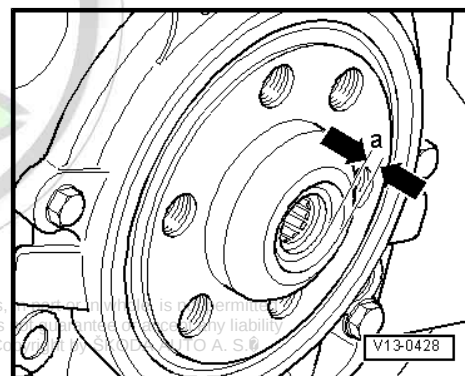
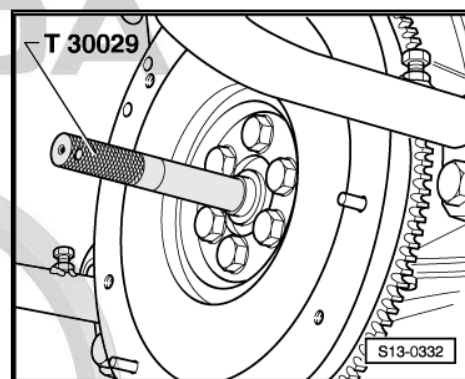
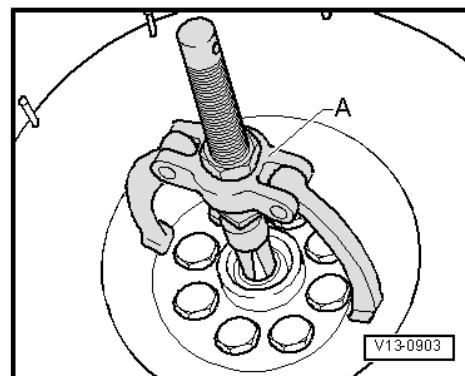
Place internal extractor behind needle bearing.

Installing

- Drive the needle bearing with the centring mandrel - T30029- into the crankshaft.
- The marked side of the needle bearing (gasket ring side) should be legible when in its installed condition.

Depth of installation of the needle bearing:

- ◆ Dimension -a- = 1.5 ± 1.8 mm



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3.4 Disassembling and assembling pistons and conrods

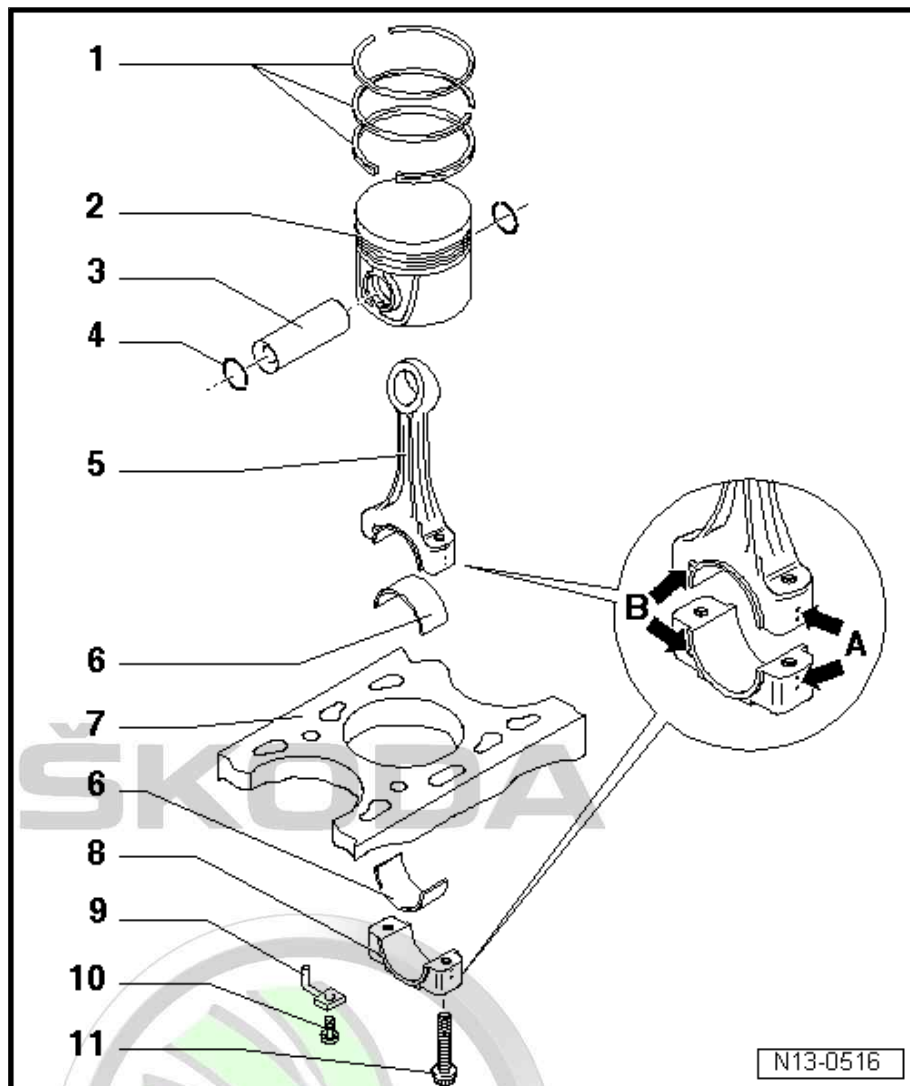


1 - Piston rings

- ☐ Offset gaps by 120°.
- ☐ use piston ring pliers for removing and installing
- ☐ marking "TOP" faces piston crown
- ☐ Check ring gap
⇒ [page 65](#)
- ☐ Check end clearance
⇒ [page 65](#)

2 - Piston

- ☐ with combustion chamber
- ☐ Mark the installation position and the assignment to cylinder
- ☐ Installation position and assignment of piston/cylinder ⇒ [page 66](#)
- ☐ arrow on the piston crown faces towards the belt pulley side
- ☐ replace piston if there is any sign of crack formation on the piston body
- ☐ Inspecting piston
⇒ [page 66](#)
- ☐ Piston dimension: $\varnothing$ 80.96 mm
- ☐ Install using piston ring tensioning strap
- ☐ inspect piston projection at TDC ⇒ [page 67](#)



3 - Piston pin

- ☐ if stiff, heat piston to approx. 60°C
- ☐ use drift - 222A- for removing and installing

4 - Circlip

5 - Connecting rod

- ☐ always replace as a set only
- ☐ Mark assignment to cylinder -A-.
- ☐ Fitting position: markings -B- point towards the belt pulley side
- ☐ with a split bearing cap
- ☐ separate new conrod ⇒ [page 68](#)

6 - Bearing shell

- ☐ Fitting position ⇒ [page 67](#)
- ☐ do not mix up already used bearing shells (mark)
- ☐ Observe version: top bearing shell (towards the piston) must be made from a long lasting material, recognition feature for new bearing shells: black marking on the contact surface near the separation point
- ☐ insert in middle ⇒ [page 67](#)
- ☐ check for firm seating
- ☐ Axial play wear limit: 0.37 mm

7 - Cylinder block

- ☐ Inspect cylinder ⇒ [page 67](#)
- ☐ Cylinder dimension: $\varnothing$ 81.01 mm

8 - Connecting rod bearing cap

- ☐ Check fitting position
- ☐ cracked cover fits only in one position at the relevant conrod

9 - Oil spray jet

- ☐ for cooling pistons

10 - 25 Nm

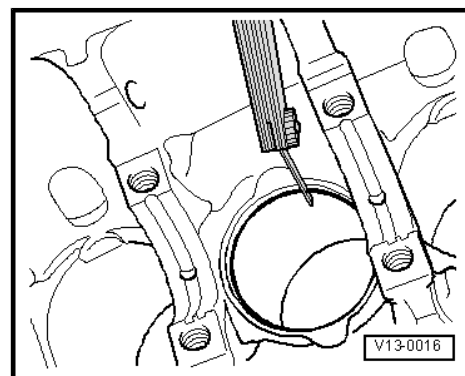
- ☐ replace without sealant

11 - Conrod bolt, 30 Nm + torque a further + 90° (1/4 turn)

- ☐ replace
- ☐ Oil threads and contact surface.

Checking piston ring gap

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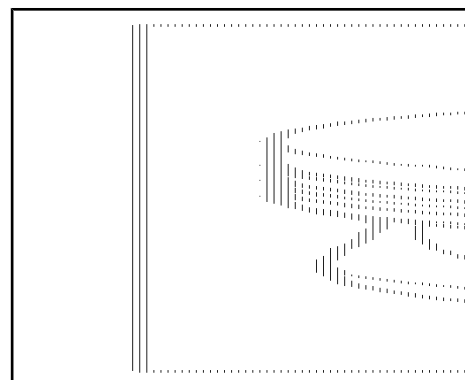
Special tools and workshop equipment required

- ◆ Feeler gauges
- Insert ring at right angles from above down into lower cylinder bore, about 15 mm away from edge of cylinder. To insert use piston without rings.

Piston ring (dimensions in mm)	New	Wear limit
1st compression ring	0.20 - 0.40	1.00
2nd compression ring	0.20 - 0.40	1.00
Oil scraper ring	0.25 - 0.50	1.00

Checking ring-to-groove clearance

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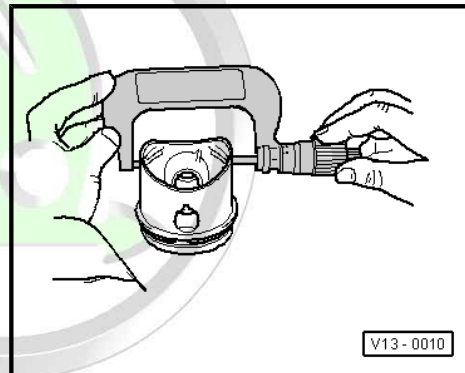
Special tools and workshop equipment required

- ◆ Feeler gauges
- Clean before inspecting the annular grooves of the piston.



Piston ring (dimensions in mm)	New	Wear limit
1st compression ring	0.06 - 0.09	0.25
2nd compression ring	0.05 - 0.08	0.25
Oil scraper ring	0.03 - 0.06	0.15

Inspecting piston



Special tools and workshop equipment required

- ◆ External micrometer
 - Measure about 10 mm from the lower edge, offset at right angles to the piston pin shaft.
 - Maximum deviation from specified dimension: 0.04 mm

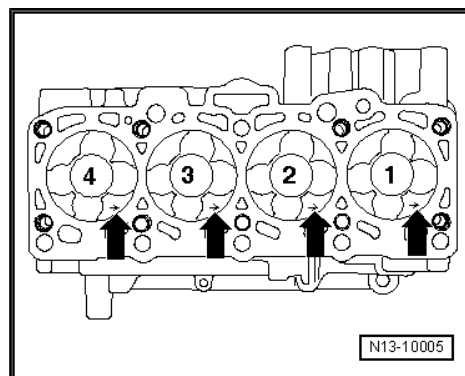
Installation position and assignment of piston/cylinder

For engines with code BKD, AZV

For engines with code BKD, AZV

Pistons in cylinders 1...4:

- Arrow on the piston crown to the belt pulley side -arrows-.



For engines with code BTS

Pistons in cylinders 1 and 2:

- Large piston relief for inlet valve to flywheel side -arrows-.

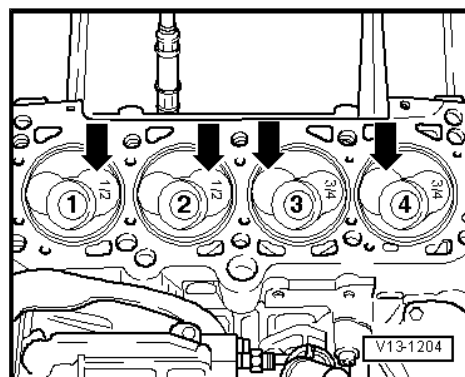
Pistons in cylinders 3 and 4:

- Large piston relief for inlet valve to belt pulley side -arrows-.

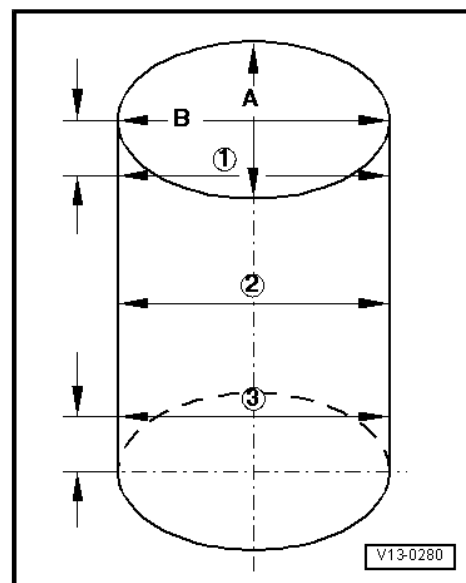


Note

- ◆ For new pistons the cylinder assignment is colour-coded on the piston crown.
- ◆ Piston of cylinder 1 and 2: marking 1/2
- ◆ Piston of cylinder 3 and 4: marking 3/4



Checking cylinder bores

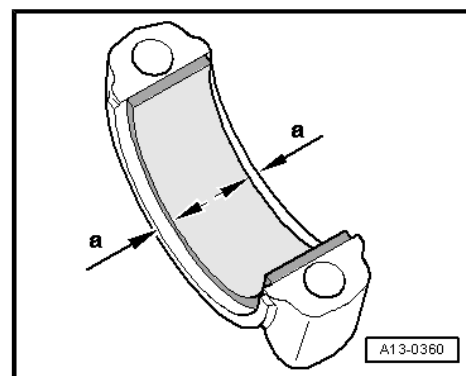


Special tools and workshop equipment required

- ◆ Cylinder gauge
- Measure cylinder at 3 points crosswise in transverse direction -A- and lengthwise -B-.
- Maximum deviation from specified dimension: 0.10 mm

Installation position of the bearing shells in the conrod

- Insert bearing shell in the conrod or in the center of the conrod bearing cap.
- Dimension -a- = 2.5 mm



3.5 inspect piston projection at TDC

Special tools and workshop equipment required

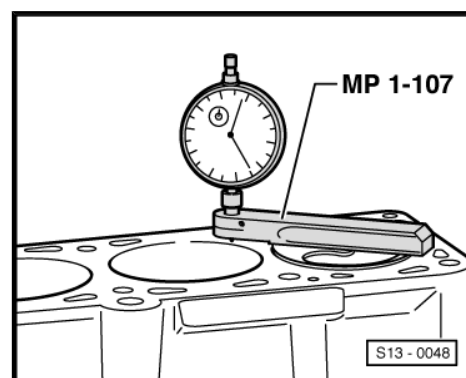
- ◆ Measuring tool for liner pretension - MP 1-107-

Test sequence

When fitting new pistons or a partial engine, check the piston projection in TDC on all pistons.

Depending on the piston projection fit the relevant cylinder head seal in accordance with the table below.

Piston projection over cylinder block top side mm	Marking of bores
0.91 - 1.00	1
1.01 - 1.10	2
1.11 - 1.20	3





Identification of the cylinder head gasket

- ◆ Part number = -arrow 1-
- ◆ Control code = -arrow 2- (ignore)
- ◆ Bores = -arrow 3-



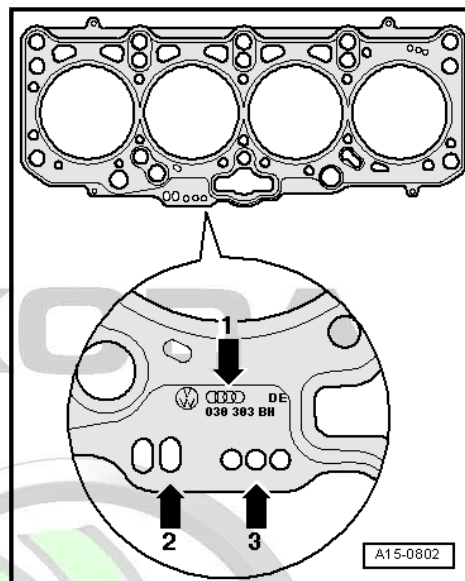
Note

- ◆ Differing thicknesses of cylinder head gaskets are inserted according to the piston projection. When replacing the seal, use a new seal with the same marking -arrow 3-.
- ◆ If different values are measured during the projection measurement of the piston, the greatest dimension applies for the seal assignment.



Note

If different values are measured during the projection measurement of the piston, the greatest dimension applies for the seal assignment.



3.6 Separating new connecting rod

It can happen that on new conrods, the provided separation point is not completely cracked. If the conrod bearing cap cannot be removed by hand, proceed in the following manner:

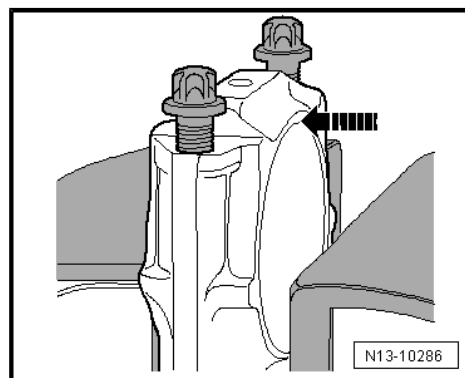
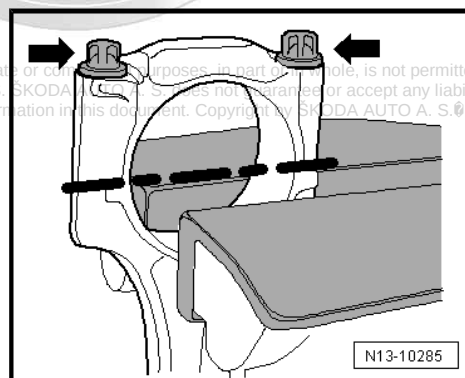
- Mark the assignment of the connecting rod to the cylinder.
- Slightly clamp the conrod, as shown in the illustration, in a vice with aluminium protective jaws.



Note

- ◆ Only tension the conrod slightly in order to avoid damage on the conrod.
- ◆ The conrod is clamped below the broken line.
- Unscrew both screws -arrows- by approx. 5 turns.
- Knock against the conrod bearing cap with a plastic hammer in -direction of arrow- in order to loosen it.

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15 – Cylinder head, valve gear

1 Removing and installing cylinder head



Note

- ◆ *Cylinder heads with cracks between the valve seats may continue to be used without any reduction in the life time provided the cracks are slight and max. 0.5 mm wide.*
- ◆ *It is not permissible to rework the cylinder heads of diesel engines.*
- ◆ *Replace O-rings and gaskets.*
- ◆ *Replace cylinder head bolts and screws which have been tightened to a torquing angle.*
- ◆ *When installing an exchange cylinder head with the camshafts installed, it is necessary to oil the contact surfaces between the roller arms and the cams after installing the head.*
- ◆ *Do not remove the plastic bases supplied as a protection for the open valves until just before fitting on the cylinder head.*
- ◆ *When replacing the cylinder head, replace all the coolant.*
- ◆ *If the engine is damaged and there is a suspicion that this damage was caused due to a mixture of oil with fuel (engine odour test), then it is essential to check whether the tandem pump is sealed on the inside ⇒ [page 178](#).*
- ◆ *Change contaminated engine oil ⇒ Maintenance ; Booklet Octavia II .*

1.1 Summary of components for engines with code BKD, AZV



1 - Rear toothed belt guard

2 - Rubber bowl

- ☐ Replace if damaged.

3 - Pin screw, 10 Nm

4 - Hub

- ☐ for intake camshaft with rotor for Hall sender - G40-
- ☐ to remove use extractor - T10052-

5 - 100 Nm

- ☐ to release and tighten use counterholder - T10051 -

6 - Hub

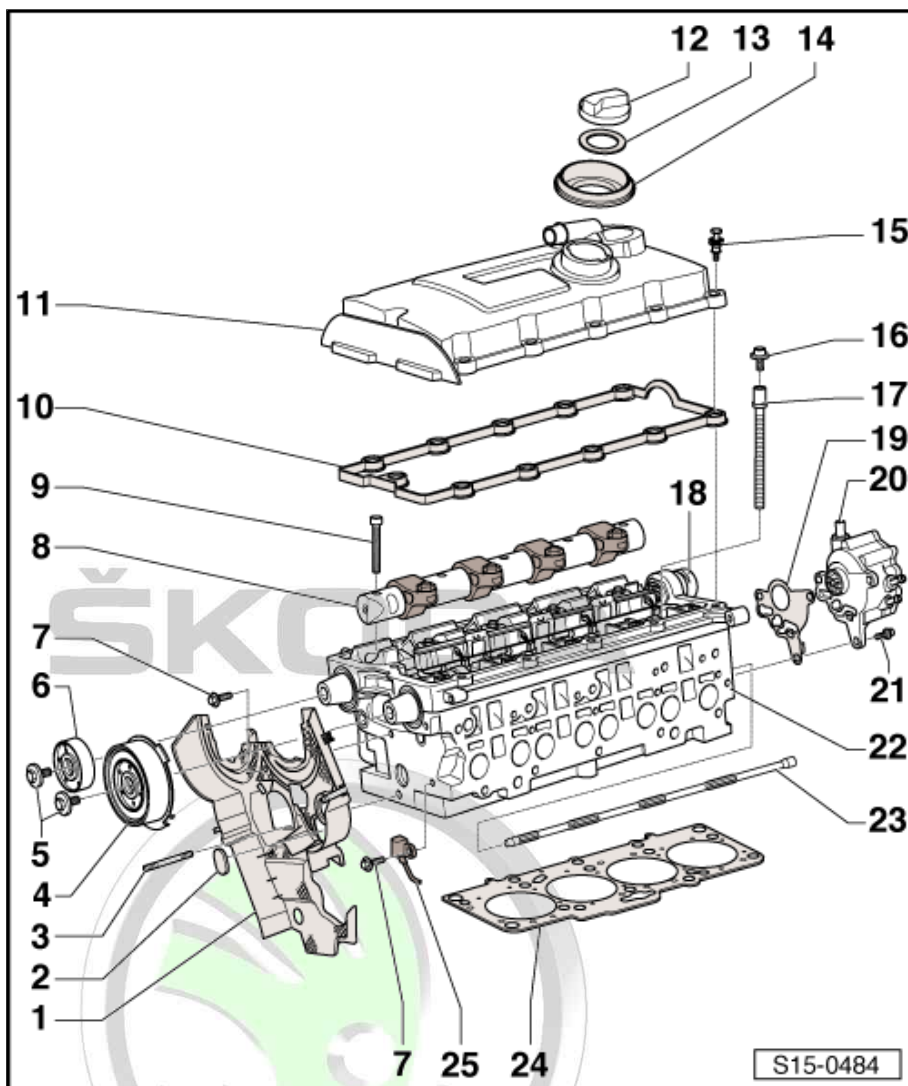
- ☐ For exhaust camshaft.
- ☐ to remove use extractor - T10052-

7 - 10 Nm

- ☐ insert using locking agent - D 000 600 A2-

8 - Valve-lever shaft

- ☐ Mark the installation position of the valve lever.
- ☐ Do not interchange
- ☐ Removing and installing ⇒ [page 73](#)
- ☐ Before installation, check that all ball studs and O-rings are inserted in the unit injectors



9 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ pay attention to order for slackening ⇒ [page 74](#)
- ☐ Pay attention to sequence and procedure when tightening ⇒ [page 77](#)

10 - Gasket for cylinder head cover

- ☐ replace if damaged or leaking
- ☐ Press onto spacer sleeves (Pos. 15)

11 - Cylinder head cover

- ☐ Removing and installing ⇒ [page 72](#)

12 - Screw cap

13 - Gasket

- ☐ replace if damaged or leaking

14 - Sealing sleeve

15 - Screw with spacer sleeve, 10 Nm

- ☐ Pay attention to sequence for loosening and tightening ⇒ [page 72](#)

16 - 20 Nm

17 - Cylinder head screw

- ☐ replace

- ☐ pay attention to order for slackening ⇒ [page 74](#)
- ☐ Pay attention to sequence and procedure when tightening ⇒ [page 78](#)

18 - Multipin plug connection

- ☐ central for unit injectors
- ☐ When removing from bearing bush, disconnect plug connection by turning anti-clockwise

19 - Gasket

- ☐ replace

20 - Tandem pump

- ☐ Removing and installing ⇒ [page 171](#)
- ☐ Check ⇒ [page 174](#)

21 - 20 Nm

22 - Cylinder head

- ☐ Removing ⇒ [page 74](#)
- ☐ check for distortion ⇒ [page 71](#)
- ☐ installing ⇒ [page 77](#)
- ☐ After replacing, fill with fresh coolant ⇒ [page 135](#)

23 - Mixing tube

- ☐ inserted into cylinder head
- ☐ pull out with hook
- ☐ Installation position of mixing tube ⇒ [page 71](#)

24 - Cylinder head gasket

- ☐ Replace ⇒ [page 74](#)
- ☐ Pay attention to the marking ⇒ [page 72](#)

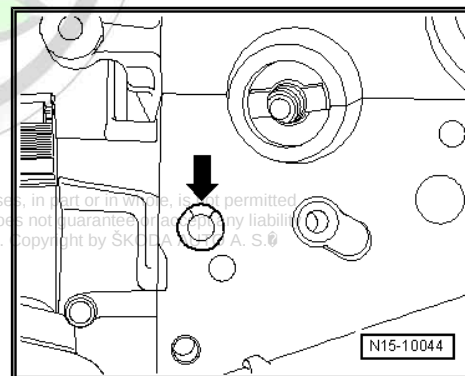
25 - Hall sender - G40-

- ☐ for camshaft position

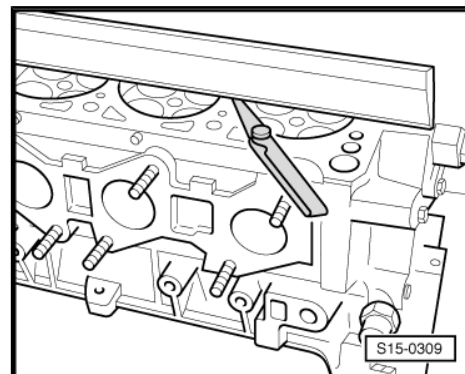
Installation position of mixing tube

The recess on the mixing tube points upwards -arrow-,

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Checking cylinder head for distortion





Special tools and workshop equipment required

- ◆ Feeler gauges
- ◆ Knife-edge straightedge
- Inspect cylinder head at several points for distortion using a knife-edge straightedge and feeler gauge.
- Max. permissible distortion: 0,05 mm



Note

It is not permissible to rework the cylinder heads of diesel engines.

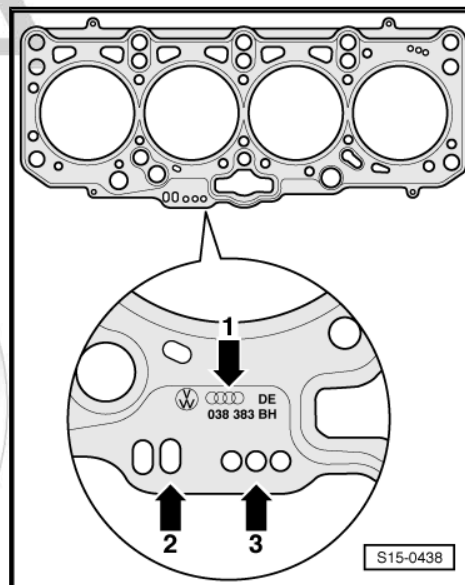
Identification of the cylinder head gasket

- ◆ Part number = -arrow 1-
- ◆ Control code = -arrow 2- (ignore)
- ◆ Bores = -arrow 3-



Note

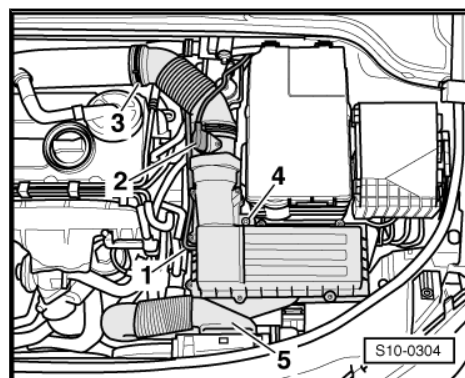
Differing thicknesses of cylinder head gaskets are inserted according to the piston projection. If only the gasket is replaced, it must be replaced with a new gasket with the same marking.



1.2 Removing and installing cylinder head cover for engines with code BKD, AZV

Removing

- Remove engine cover ➔ [page 13](#) .
- Pull off hose -3-.

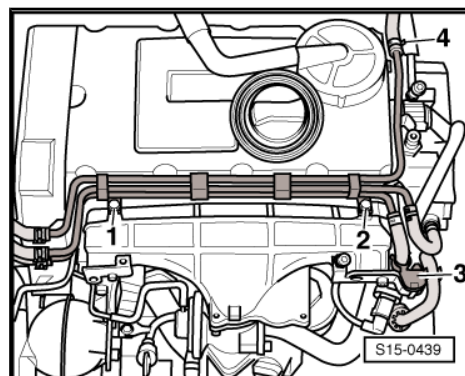


- Unscrew screws -1- and -2- and loosen holder -3- for fuel hoses on left engine lifting eye.

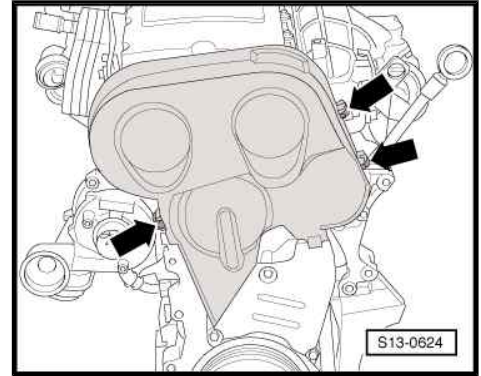


Note

Coolant hoses as well as fuel lines remain connected.



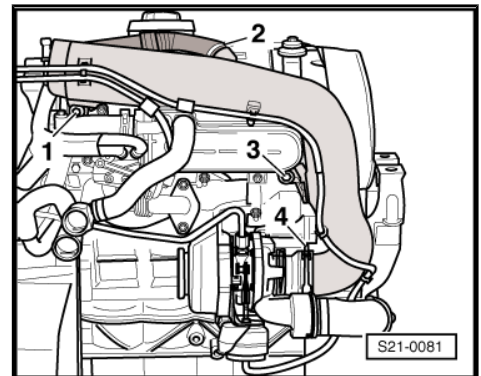
- Remove top toothed belt guard; to do so, release retaining clips -arrows-.



- Remove screws -1- and -3-.
- Remove crankcase ventilation hose -2- from charge air pipe to turbocharger and push charge air pipe to rear.

i Note

- ◆ The charge air pipe -Position 4- remains connected to the turbocharger.
- ◆ The illustration shows the view from behind with engine removed.



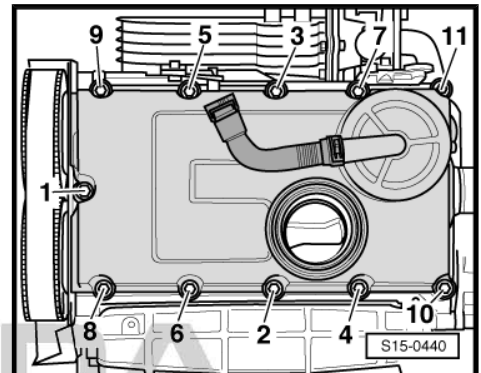
- Undo the screws for the cylinder head cover in the sequence -11...1-.
- Unscrew the screws and remove cylinder head cover with seal.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

i Note

Replace the gasket and the screws for the cylinder head cover in case of damage.



- Tighten the screws for the cylinder head cover in the sequence -1...1- initially by hand and then to 10 Nm.

1.3 Removing and installing cylinder head for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Supporting device - T30099-
- ◆ Surface - T30099/1-
- ◆ Hook - MP 9-200/10 (10-222A/10)-
- ◆ Mounting bracket - T10014-
- ◆ Counterholder - T10051 -
- ◆ Extractor - T10052-
- ◆ Rig pin for the injection pump - 3359- or -MP 1-301 - (2x)
- ◆ Crankshaft arrester - T10050- or crankshaft arrester - T10100-

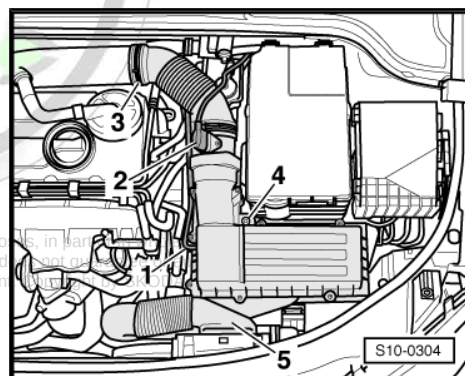
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- ◆ Locking pin - T10060- or -T10060A -
- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Pliers for spring-type clips
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Protective goggles and gloves

1.3.1 Removing

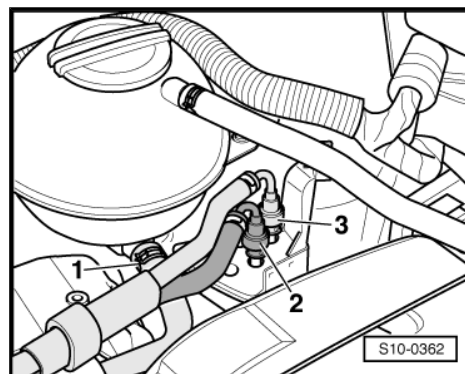
- Switch off ignition and pull out ignition key.
- Remove engine cover ➔ [page 13](#) .
- Remove air filter with air guide hose and intake hose ➔ [page 208](#) .
- Drain coolant ➔ [page 135](#) .
- Safety instructions when working on the injection system ➔ [page 3](#) .



- Detach fuel feed line -3- and fuel return-flow line -2-, to do so press in securing ring.
- Extract fuel from the fuel tank ➔ [page 171](#) .
- Remove toothed belt ➔ [page 26](#) .

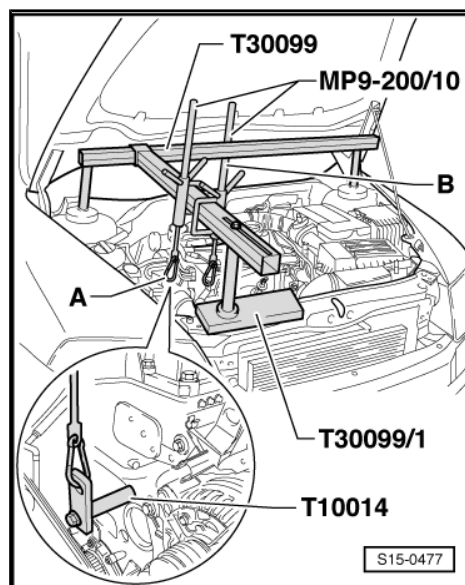
For vehicles up to 05.05, support the engine as described below.

Vehicles up to 05.05

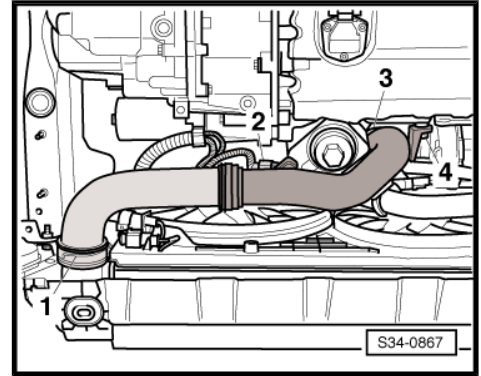


- Screw bracket - T10014 - into the threaded hold above the coolant pump. Tighten screw for bracket to 20 Nm.
- Carefully raise the engine with spindle -A-, thereby releasing the spindle -B-.
- Push spindle -B- forwards.

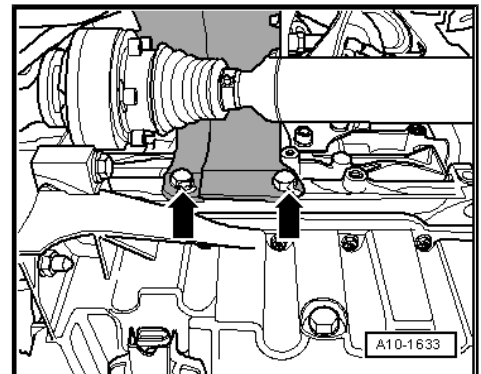
Continued for all vehicles



- Disconnect connector -2-, unscrew screw -4- and remove front charge air hose together with connecting hose; do so by lifting retaining clips -1- and -3-.



- Unbolt heat shield for right drive shaft -arrows-.



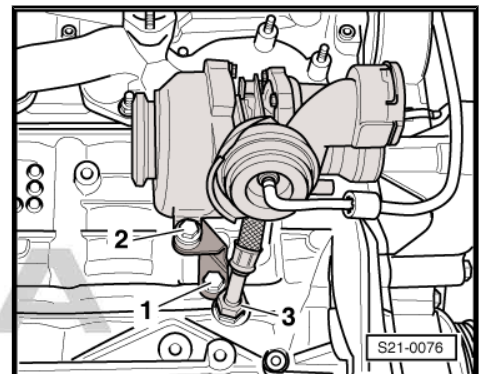
- Remove pre-exhaust pipe from exhaust gas turbocharger, release clamping sleeve and push pre-exhaust pipe to the rear ➔ [page 229](#) ,
- Release screws -1- and -2- and remove the support for turbocharger.



Note

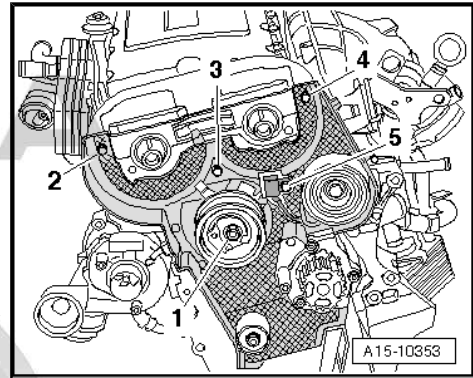
Collect any engine oil which flows out with a cloth.

- Remove the oil return line -3- at the cylinder block.
- Unscrew oil feed line from turbocharger, exhaust manifold and coolant pipe and lay it to one side.
- Remove connection pipe for exhaust gas recirculation between mechanical valve and exhaust gas recirculation cooler ➔ [page 241](#) .
- Remove camshaft sprockets and remove hubs for camshafts ➔ [page 27](#) .





- Unscrew screws -2...4-.
- Unscrew nut -1- for tensioning pulley.
For vehicles up to 05.05, remove the tensioning pulley for toothed belt.
- Unscrew screw -5- and remove Hall sender - G40- from cylinder head.
- Disconnect all remaining plug connections at cylinder head and lay aside the electrical lines.
- Unscrew fixing screws of dipstick guide, pull guide upwards and out of cylinder block and swivel forward to remove.
- Disconnect the hose from the vacuum reservoir, unscrew the screw and remove the reservoir from the holder. Then remove the holder.
- Separate all remaining coolant, charge air and vacuum hoses from the cylinder head.
- Remove cylinder head cover ➤ [page 72](#) .
- Remove screws -1-, -3- and -5-.
- Undo screws -2- and -4- and alternately remove in several stages.

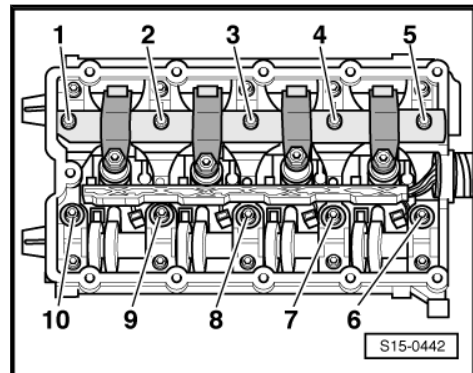
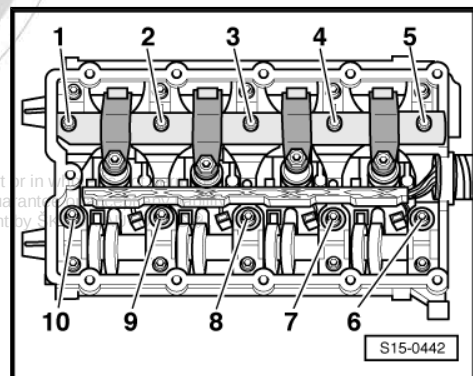


Note

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Do not remove the screws from the valve lever shaft in order that the individual parts remain attached to the valve lever shaft. Mark the allocation of individual parts if necessary.

- Remove valve-lever shaft.
- Unscrew screws -6...10- for bearing frame.



- Unscrew the cylinder head bolts in the order shown.



Note

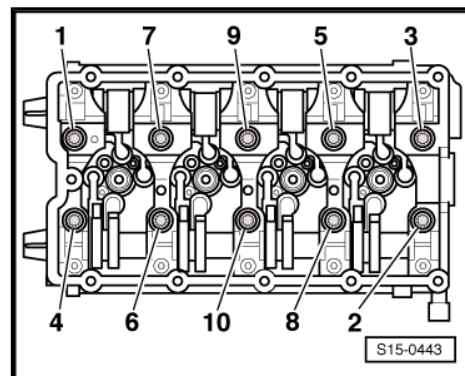
For the following working steps a 2nd mechanic is required.

- Lift the cylinder head slightly and release it from the rear toothed belt guard by moving it to the left.



Note

- ◆ *The toothed belt tensioning pulley remains on the engine support on vehicles from 05.05 onwards.*
- ◆ *The cylinder head must be guided carefully so that no damage occurs.*
- Place the cylinder head down on a soft surface with the sealing surface facing upwards.



1.3.2 Installing



Note

- ◆ *There must not be any oil or coolant present in the blind holes for the cylinder head bolts.*
- ◆ *Replace cylinder head bolts.*
- ◆ *When performing installation work replace the self-locking nuts.*
- ◆ *Replace screws which have been tightened to a torquing angle as well as sealing rings and seals.*
- ◆ *Remove the new cylinder head gasket from its wrapping immediately before fitting.*
- ◆ *Treat the seal with the utmost care. Damage to the silicone layer and in the area of the bead results in leakages.*
- ◆ *When installing an exchange cylinder head with the camshafts installed, it is necessary to oil the contact surfaces between the roller arms and the cams after installing the cylinder head.*
- ◆ *The plastic base for protecting the open valves should only be removed immediately before attaching the cylinder head.*
- ◆ *Secure all hose connections with corresponding hose clips.*



WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

- Make sure that when cleaning the cylinder head and cylinder block no foreign particles can get into the cylinder or into the oil and coolant galleries.
- Carefully remove old sealant residue from the cylinder head and cylinder block using a chemical sealant remover.
- Before fitting the cylinder head rotate the crankshaft so that all the pistons are almost evenly under TDC.

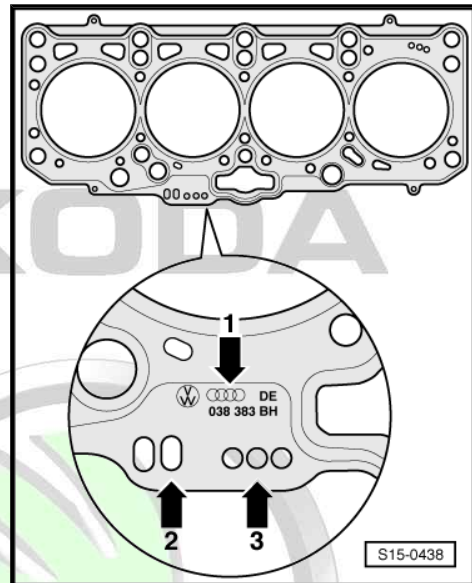


- Pay attention to the identification of the cylinder head seal.
- ◆ Part number = -arrow 1-
- ◆ Control code = -arrow 2- (ignore)
- ◆ Bores = -arrow 3-

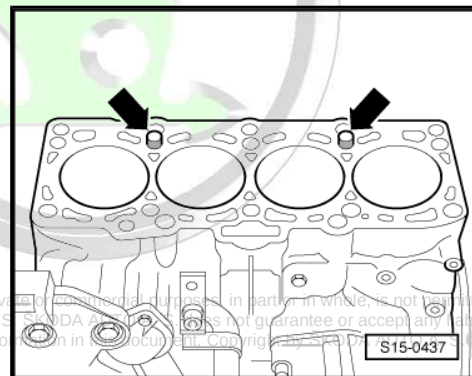


Note

- ◆ If the cylinder head gasket or cylinder head are replaced, then install a new cylinder head gasket with the same identification -arrow 3-.
- ◆ If parts of the crankshaft drive were replaced, then the new cylinder head gasket must be redefined by measuring the protrusion of the piston in TDC.

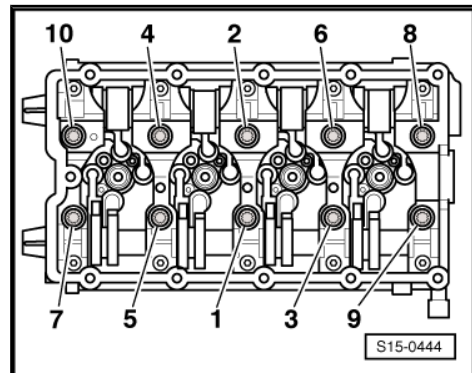


- Fit on cylinder head gasket.
- Pay attention to dowel sleeves -arrows- in cylinder block.
- Observe the installed position of the cylinder head gasket, the marking "above" or the part number must point to the cylinder head.
- Insert the cylinder head.



- Insert new cylinder head bolts and tighten by hand.
- Tighten the cylinder head in four stages in the indicated tightening sequence:

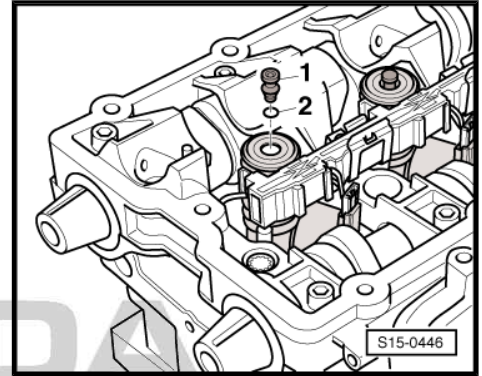
Stage	Apply
I	– Tighten with the torque wrench to 40 Nm.
II	– Tighten with the torque wrench to 60 Nm.
III	– Using a rigid wrench torque a further 90° (1/4 turn).
IV	– Using a rigid wrench torque a further 90° (1/4 turn).



Note

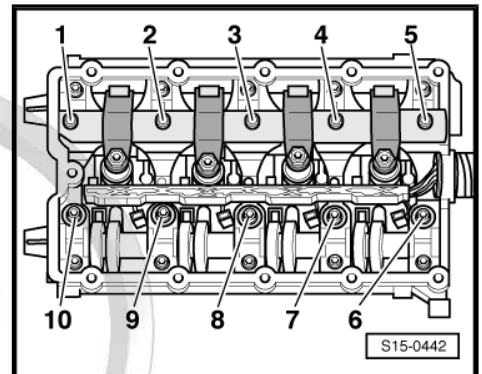
Tightening up the cylinder head bolts after doing repair work is not necessary.

- Before inserting the valve-lever shaft, check that all ball studs -1- and O-rings -2- have been inserted in the unit injectors.



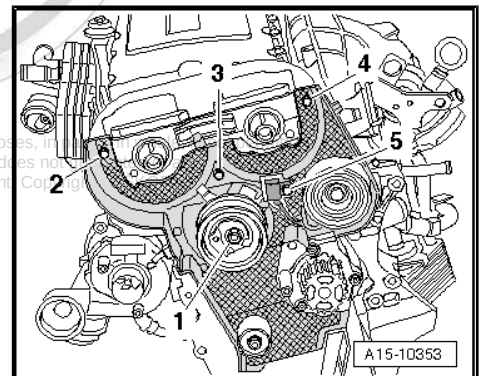
- Screw in the valve-lever shaft and bearing bush as follows:
- Replace screws -1 ... 5-.

Se- quence	Apply
I	– Alternately tighten screws -2- and -4- in stages until the valve-lever shaft is resting on the bearing bush.
II	– Tighten screws -1-, -3- and -5- to 20 Nm + torque a further 90° (1/4 turn).
III	– Tighten screws -2- and -4- to 20 Nm + torque a further 90° (1/4 turn).
IV	– Tighten bearing frame screws -6...10- to 20 Nm.

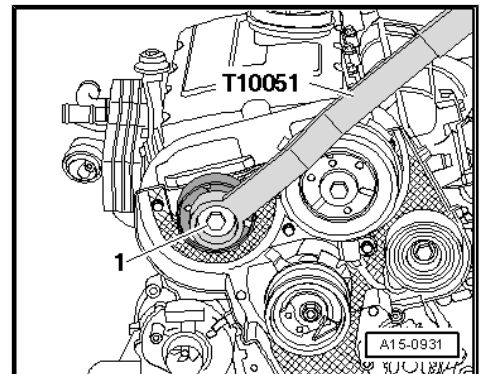


- Insert screws -2...5- with applied locking agent - D 000 600 A2- and tighten to 10 Nm.
- Screw in the pin screw -1- and tighten to 10 Nm.

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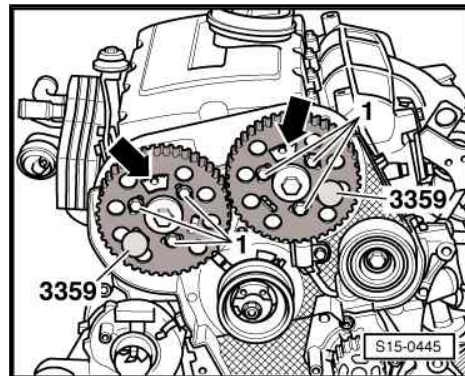


- Place hub on exhaust camshaft.
- Tighten screw -1- to 100 Nm, use counterholder - T10051- to hold.
- In the same way, place hub on intake camshaft and tighten the hub.





- Push camshaft sprockets onto hubs.
- The two tooth segments -arrows- on the camshaft wheels must both be at the top.
- Slightly screw in plug -1-.
- Camshaft sprockets must still turn on the hubs, but must not tilt.
- Lock hubs using rig pins - 3359- .
- Rotate crankshaft to TDC for cylinder 1.

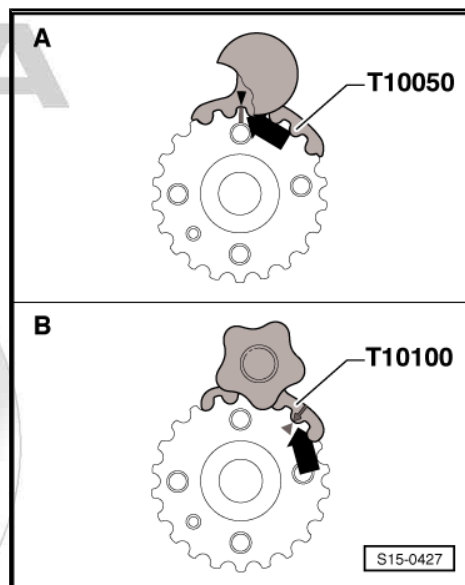


- Depending on the version, lock the crankshaft toothed belt sprocket using the crankshaft arrester - T10050- or crankshaft arrester - T10100- .

Distinguishing the crankshaft toothed belt sprocket:

A = original version of toothed belt sprocket with circular tooth flanks, rectangular TDC marking on tooth in 12 o'clock position for cylinder 1 - use crankshaft arrester - T10050 -

B = new version of toothed belt sprocket with elliptical tooth flanks, triangular TDC marking on the gap in the sprocket in 1 o'clock position - use crankshaft arrester - T10100-



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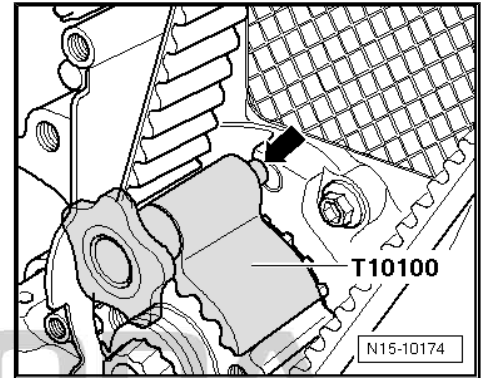
Note

- ◆ *Markings on the toothed belt sprocket and on the crankshaft arrester must be in line with each other -arrow-.*
- ◆ *The pin on the crankshaft arrester -arrow- must engage into the hole in the sealing flange.*
- ◆ *The crankshaft arrester can only be fitted onto the toothed belt sprocket from the front side of the serration.*

- install (set the timing) ⇒ [page 35](#) .
- Install cylinder head cover ⇒ [page 72](#) .

Further installation occurs in reverse order to removal. Pay attention to the following:

- Connect the oil lines to the exhaust gas turbocharger and install the exhaust gas turbocharger support.
- Install exhaust system ⇒ [page 229](#) .
- Align exhaust system free of stress ⇒ [page 239](#) .
- Checking the oil level ⇒ Maintenance ; Booklet Octavia II .



Note

Change contaminated engine oil ⇒ Maintenance ; Booklet Octavia II .

- Top up coolant ⇒ [page 135](#) .

1.4 Checking the compression pressure for engines with code BKD, AZV

The compression pressure is tested using a guided "fault-finding program" of the vehicle diagnosis, measurement and information system - VAS 5051- , under "Repair Group 15; Cylinder head/ valve gear; Particular System, Boundary Conditions; Diagnostic Object: Poor compression pressure".

1.5 Summary of components for engines with code BMM



1 - Vacuum hose

- ☐ for connecting piece of tandem pump / brake booster

2 - Screw cap

3 - Connecting pipe

- ☐ for crankcase ventilation
- ☐ To intake hose

4 - Screw with spacer sleeve, 10 Nm

- ☐ Pay attention to sequence for loosening and tightening
⇒ [page 83](#)

5 - Tandem pump

- ☐ Removing and installing
⇒ [page 172](#)
- ☐ Check ⇒ [page 174](#)

6 - 20 Nm

7 - 10 Nm

8 - Coolant flange

9 - O-ring

- ☐ replace

10 - 10 Nm

11 - Sealing rings

- ☐ replace

12 - Mixing tube

- ☐ inserted in the head
- ☐ pull out with hook

13 - Cylinder head gasket

- ☐ Replace ⇒ [page 90](#)
- ☐ Pay attention to the marking ⇒ [page 72](#)

14 - Hall sender - G40-

- ☐ for camshaft position

15 - 10 Nm

- ☐ install with locking agent - D 000 600 A2-

16 - 15 Nm

17 - 100 Nm

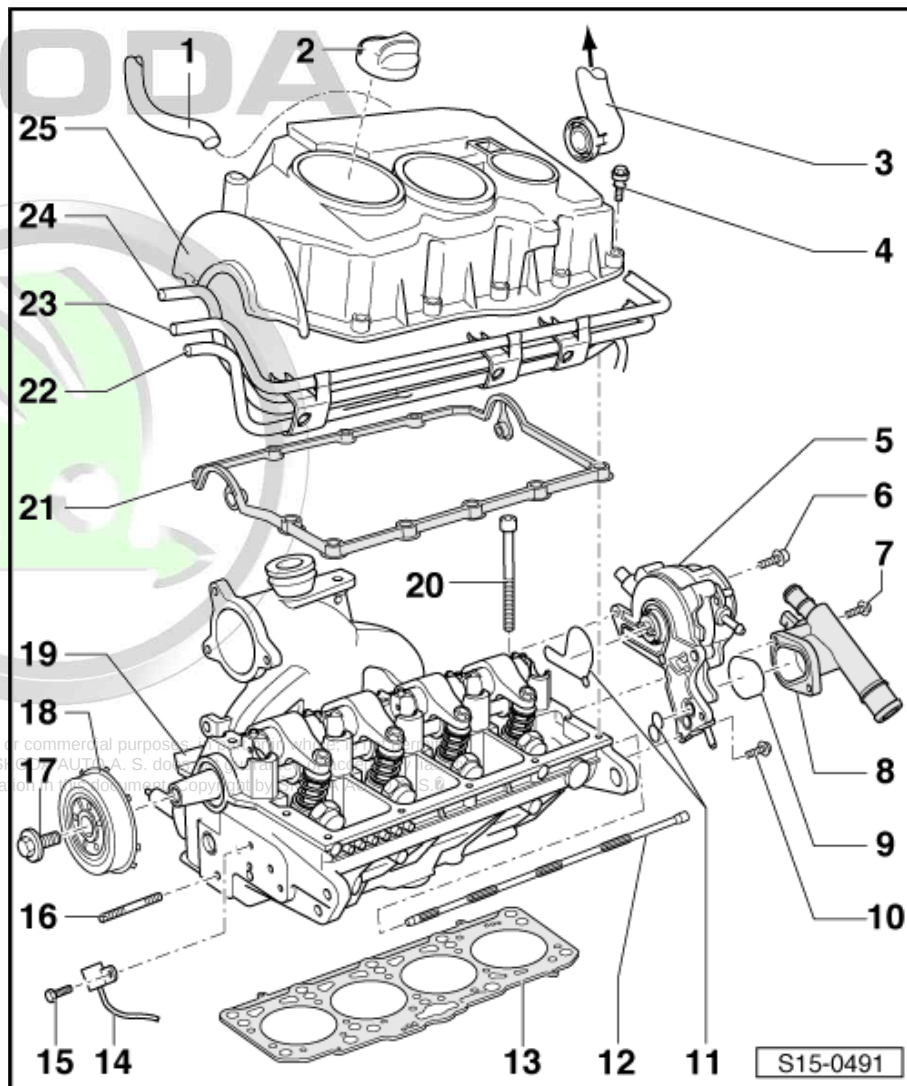
- ☐ to release and tighten use counterholder - T10051 -

18 - Hub

- ☐ with sensor rotor for Hall sensor - G40-
- ☐ to remove use extractor - T10052-
- ☐ remove ⇒ [page 113](#)

19 - Cylinder head

- ☐ Removing ⇒ [page 85](#)
- ☐ check for distortion ⇒ [page 83](#)
- ☐ installing ⇒ [page 90](#)



- ❑ After replacing, fill entire system with fresh coolant.

20 - Cylinder head screw

- ❑ replace
- ❑ pay attention to order for slackening ⇒ [page 85](#)
- ❑ pay attention to order for tightening ⇒ [page 90](#)
- ❑ before installing, insert washers into the cylinder head

21 - Gasket for cylinder head cover

- ❑ replace if damaged or leaking
- ❑ Press onto spacer sleeves (Pos. 4)
- ❑ Before fitting, seal contact faces with sealant - D 454 300 A2- ⇒ [page 83](#)

22 - Fuel return-flow line

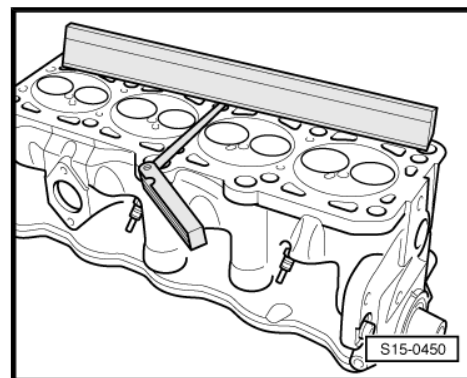
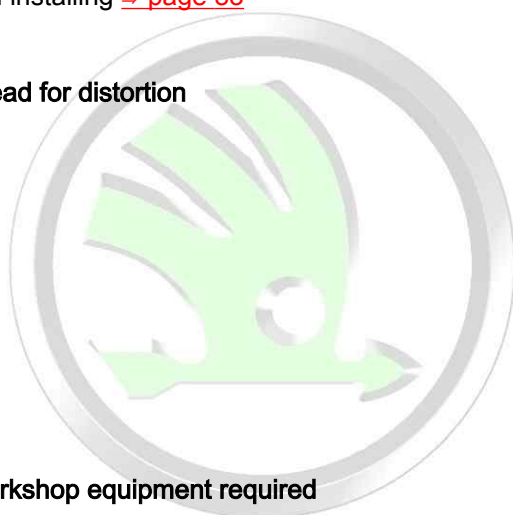
23 - fuel feed line

24 - Coolant line

25 - Cylinder head cover

- ❑ Removing and installing ⇒ [page 83](#)

Checking cylinder head for distortion



Special tools and workshop equipment required

- ◆ Feeler gauges
- ◆ Knife-edge straightedge
- Inspect cylinder head at several points for distortion using a knife-edge straightedge and feeler gauge.
- Max. permissible distortion: 0,05 mm



Note

It is not permissible to rework the cylinder heads of diesel engines.

1.6 Removing and installing cylinder head cover for engines with code BMM

Special tools and workshop equipment required

- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. - D 000 401 04-
- ◆ Protective goggles and gloves
- ◆ Sealant - D 454 300 A2-



Removing

- Remove engine cover ➔ [page 13](#) .
- Pull off hose -2- for crankcase ventilation.
- Pull off the vacuum hose to the vacuum reservoir at the cylinder head.
- Release fuel hoses and coolant hoses at right charge air pipe.
- Remove charge air pipe for intake manifold flap motor - V157- ; to do so, pull the retaining clips



Note

Coolant hoses as well as fuel lines remain connected.

- Remove top toothed belt guard, to do so release retaining clips.
- Unscrew the screws for the cylinder head cover in the sequence -13 ... 1- and remove cover.

Installing

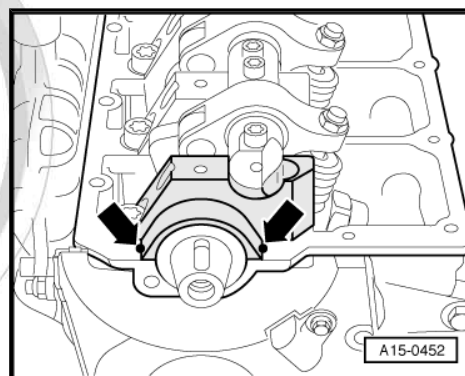
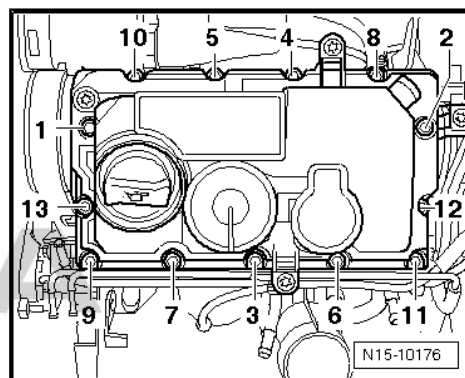
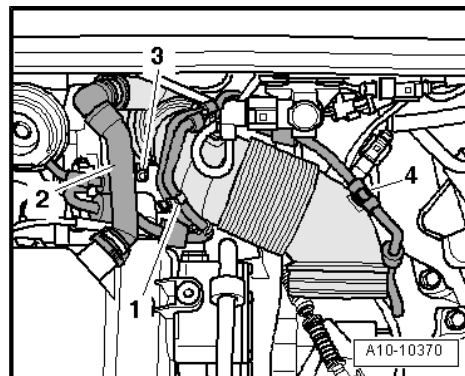
Installation occurs in reverse order to removal. Pay attention to the following:



WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

- Clear sealing surface on bearing cap and on cylinder head from sealant residues with chemical gasket remover.
- Degrease the sealing surfaces.
- Apply on both edges on the sealing surfaces of the bearing cap/cylinder head -arrows- at front ...



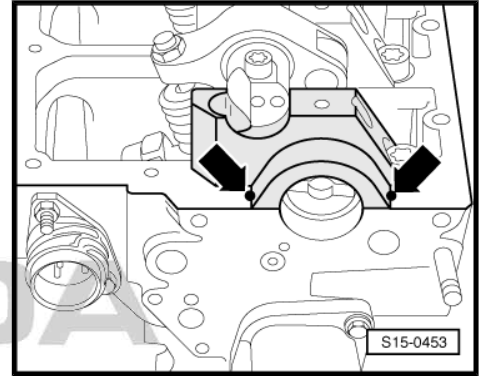
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- ... and at rear a small amount ($\varnothing$ approx. 5 mm) of sealant - D 454 300 A2- -arrows-.

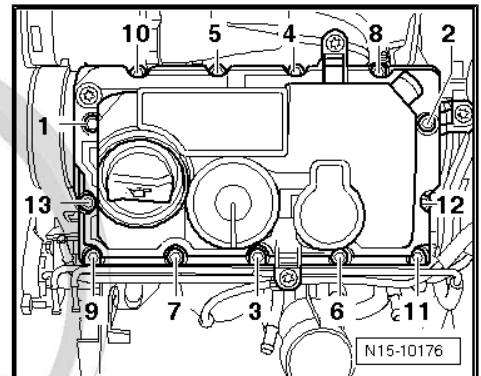


Note

Replace the gasket and the screws for the cylinder head cover in case of damage.



- Tighten the screws for the cylinder head cover in the sequence -1...13- to 10 Nm.



1.7 Removing and installing cylinder head for engines with code BMM

Special tools and workshop equipment required

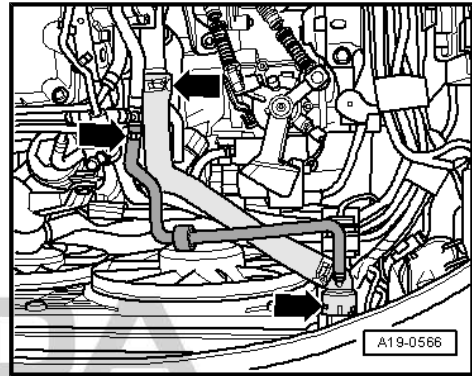
- ◆ Supporting device - T30099-
- ◆ Surface - T30099/1-
- ◆ Hook - MP 9-200/10 (10-222A/10)-
- ◆ Mounting bracket - T10014-
- ◆ Catch pan , e.g. -VAS 6208 -
- ◆ Pliers for spring-type clips
- ◆ Counterholder - T10051 -
- ◆ Locking pin - 3359- or -MP 1-301 -
- ◆ Crankshaft arrester - T10050- or crankshaft arrester - T10100-
- ◆ Workshop crane , e.g. -VAS 6100-
- ◆ Lifting device - MP 9-201-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Protective goggles and gloves

1.7.1 Removing

- Switch off ignition and pull out ignition key.
- Drain coolant ➔ [page 143](#) .
- Extract fuel from the fuel tank ➔ [page 172](#) .
- Remove air filter ➔ [page 220](#) .
- Remove intake hose with connection piece ➔ [page 193](#) .



- Remove coolant hose between engine and radiator -arrows-.
- Remove charge air pipe between the exhaust turbocharger and the charge air cooler ➔ [page 196](#) .
- Safety instructions when working on the injection system ➔ [page 3](#) .



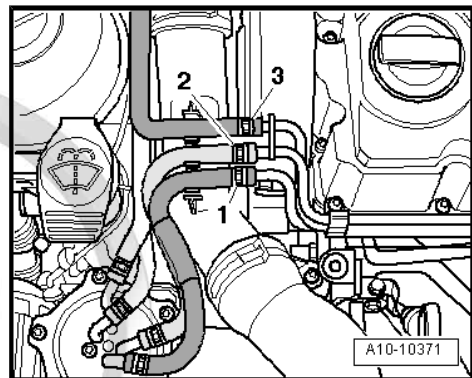
- Detach the fuel intake hose -2- and the fuel return hose -1- from the fuel lines.
- Detach coolant hose -3-.

Vehicles with auxiliary heating

- Disconnect the fuel feed line.

Continued for all vehicles

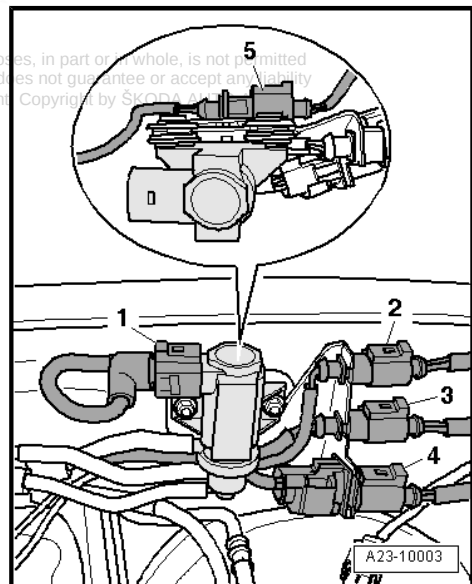
- Remove pre-exhaust pipe with diesel particle filter ➔ [page 234](#) .



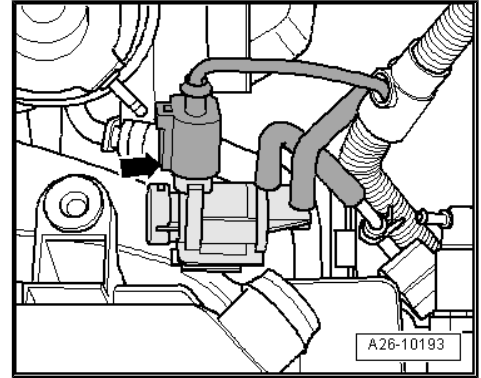
Note

On vehicles with four-wheel drive, the exhaust pipe with diesel particle filter can remain in the engine compartment and the angle gearbox must not be removed.

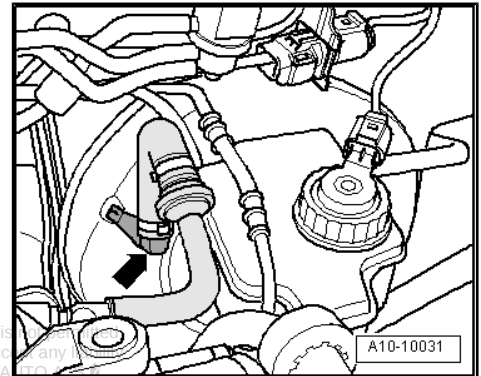
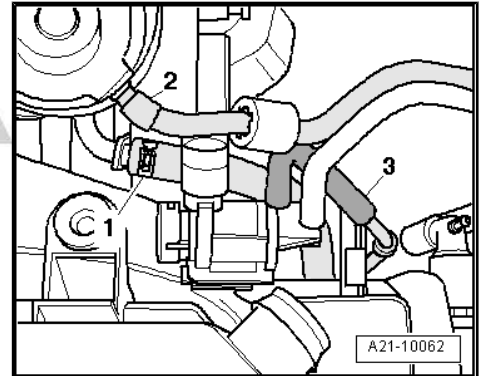
- Disconnect plug connection -5- for exhaust gas temperature sender 1 - G235- (temperature sender upstream turbocharger - G507-) and expose cable.
- Disconnect plug connection at exhaust gas recirculation cooler change-over valve - N345- -arrow-.



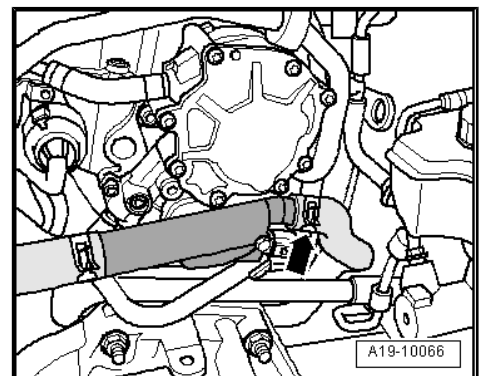
- Place electrical wiring harnesses on the bodywork.



- Remove the vacuum hose -2- at the vacuum unit for charge pressure control.
- Disconnect the vacuum hose -3- at the cable for vacuum setting element of the radiator flap for exhaust gas recirculation.
- Disconnect vacuum line at the tandem pump.
- Loosen change-over valve for exhaust gas recirculation radiator - N345- at the bracket.
- Lay changeover valve for radiator of exhaust gas recirculation - N345- with connected hoses to the side.
- Detach oil intake hose -1- from exhaust turbocharger.
- Remove oil supply pipe.
- Pull the vacuum hose -arrow- off the brake servo unit.



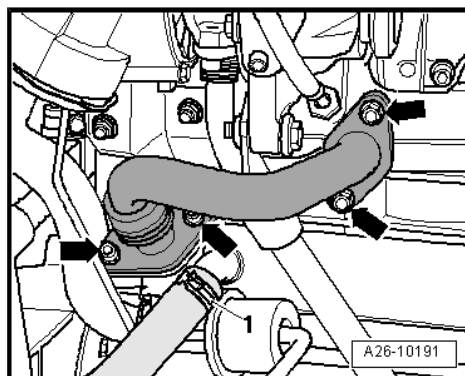
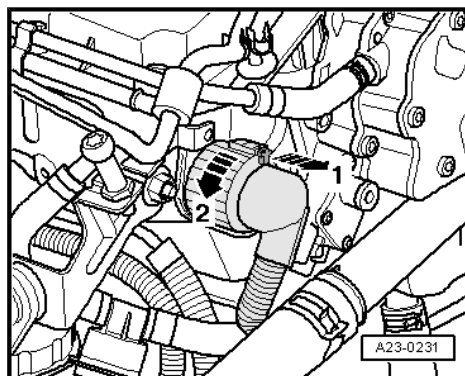
- Remove coolant hose -arrow- at coolant fitting.
- Disconnect the plug from the coolant temperature sender - G62 - and detach the electrical wiring.



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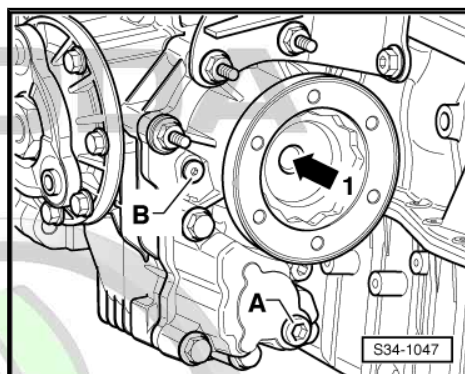
- Remove the release pin -arrow 1- and open the knurled nut -arrow 2-.
- Disconnect the central plug connection for unit injectors and uncover the wiring harness.
- Remove plug for fuel temperature sender - G81 - .
- Disconnect the edge connector from the glow plugs.
- Unscrew the fixing screws for the oil dipstick guide tube, pull out the oil dipstick guide tube to the top out of the cylinder block.
- Disconnect coolant hose -1- at exhaust gas recirculation radiator.
- Remove connection pipe for exhaust gas recirculation radiator -arrows-.



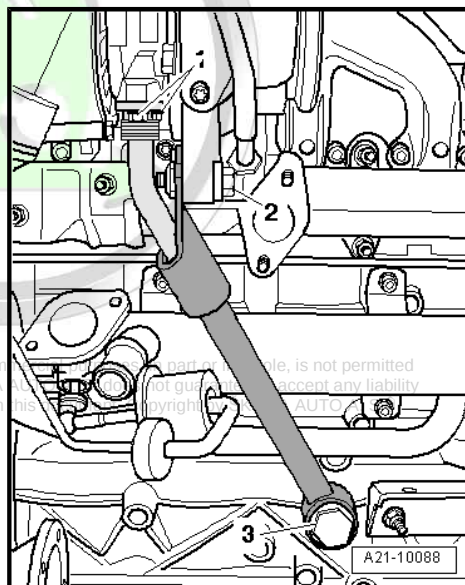
Vehicles with four-wheel drive

- Unscrew the screw for the right flange shaft -arrow 1-.
- Remove right flange shaft ⇒ Gearbox ⇒ Rep. gr. 39.

Continued for all vehicles



- Unscrew screw -2- and hollow screw -3-.
- Rotate the turbocharger support 90° and pull it down and out of the oil return line.



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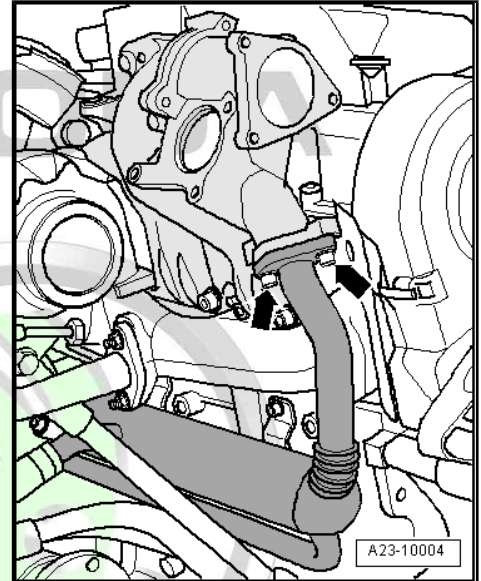
- Unscrew the screws from the support of the intake manifold flap motor - V157- -arrows-.

For vehicles with auxiliary heating:

- Remove coolant pipes to auxiliary heating with connected coolant hoses at cylinder block.

Continued for all vehicles

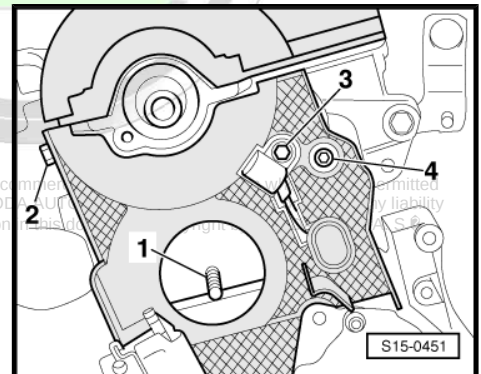
- Remove camshaft sprocket and hub ⇒ [page 113](#) .
- Remove timing belt tensioning pulley.



- Unscrew the rear toothed belt guard fixing screws -2- and -4-.
- Unscrew screw -3- and remove Hall sender - G40- from cylinder head.

Vehicles as of 03.07

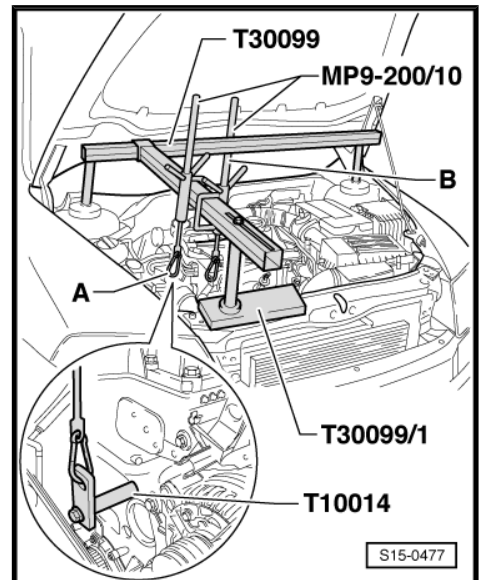
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- Screw bracket - T10014- into the threaded hold above the coolant pump. Tighten screw for bracket to 20 Nm.
- Carefully raise the engine with spindle -A-, thereby releasing the spindle -B-.
- Push spindle -B- forwards.

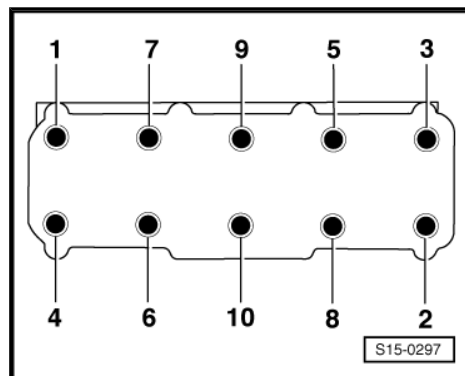
Continued for all vehicles

- Remove cylinder head cover ⇒ [page 83](#) .





- Follow the specified order for loosening cylinder head bolts.
- Slightly raise the cylinder head with lifting device - MP 9-201- and workshop crane - VAS 6100- and laterally remove from the engine next to the toothed belt guard.
- Place the cylinder head down on a soft surface with the sealing surface facing upwards.



1.7.2 Installing



Note

- ◆ *There must not be any oil or coolant present in the blind holes for the cylinder head bolts.*
- ◆ *Replace cylinder head bolts.*
- ◆ *When performing installation work replace the self-locking nuts.*
- ◆ *Replace screws which have been tightened to a torquing angle as well as sealing rings and seals.*
- ◆ *Remove the new cylinder head gasket from its wrapping immediately before fitting.*
- ◆ *Treat the seal with the utmost care. Damage to the silicone layer and in the area of the bead results in leakages.*
- ◆ *When installing a replacement cylinder head with the camshaft installed, it is necessary to oil the contact surfaces between bucket tappets and cam tracks after installing the cylinder head.*
- ◆ *The plastic base for protecting the open valves should only be removed immediately before attaching the cylinder head.*
- ◆ *Secure all hose connections with corresponding hose clips.*



WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

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- Make sure that when cleaning the cylinder head and cylinder block no foreign particles can get into the cylinder or into the oil and coolant galleries.
- Carefully remove old sealant residue from the cylinder head and cylinder block using a chemical sealant remover.
- Before fitting the cylinder head rotate the crankshaft so that all the pistons are almost evenly under TDC.

– Pay attention to the identification of the cylinder head seal.

◆ Part number = -arrow 1-

◆ Control code = -arrow 2- (ignore)

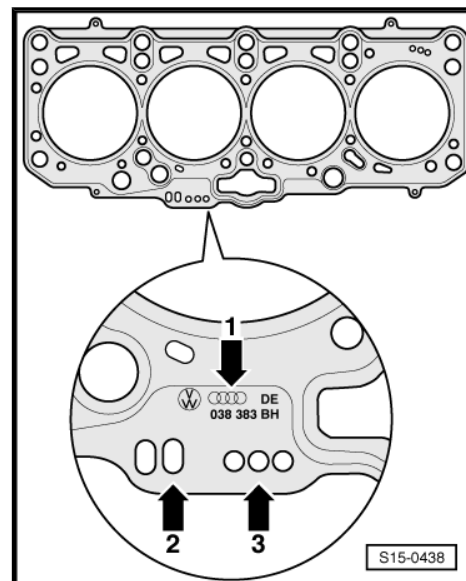
◆ Bores = -arrow 3-



Note

◆ If the cylinder head gasket or cylinder head are replaced, then install a new cylinder head gasket with the same identification -arrow 3-.

◆ If parts of the crankshaft drive were replaced, then the new cylinder head gasket must be redefined by measuring the protrusion of the piston in TDC.

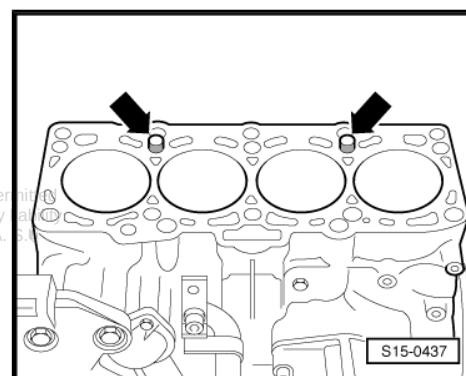


– Fit on cylinder head gasket.

• Pay attention to dowel sleeves -arrows- in cylinder block.

• Observe the installed position of the cylinder head gasket, the marking "above" or the part number must point to the cylinder head.

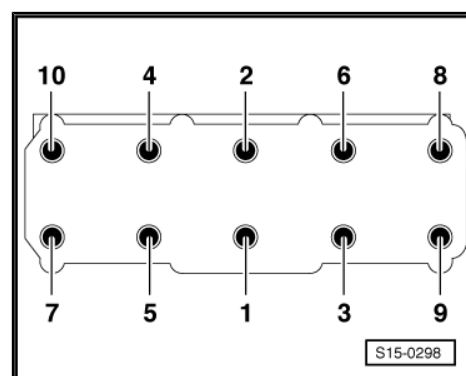
– Insert the cylinder head.



– Insert new cylinder head bolts and tighten by hand.

– Tighten the cylinder head in four stages in the indicated tightening sequence:

Stage	Apply
I	– Tighten with the torque wrench to 35 Nm.
II	– Tighten with the torque wrench to 60 Nm.
III	– Using a rigid wrench torque a further 90° (1/4 turn).
IV	– Using a rigid wrench torque a further 90° (1/4 turn).



Note

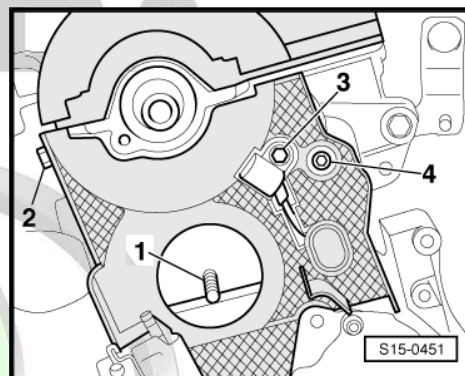
Tightening up the cylinder head bolts after doing repair work is not necessary.

– Screw lifting eye of engine onto the front cylinder head.

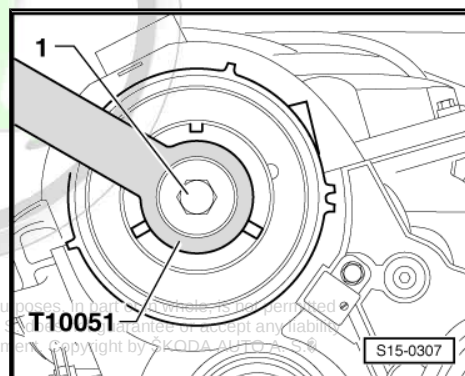
Q



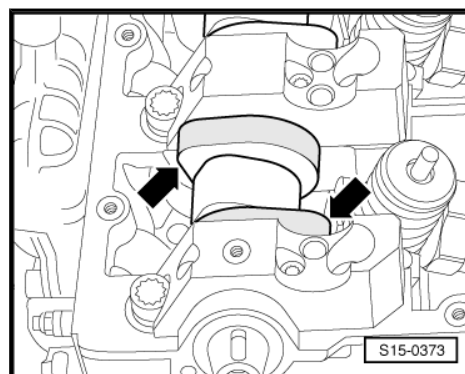
- Insert screws -2- and -4- with applied locking agent - D 000 600 A2- and tighten to 15 Nm.
- Install Hall sender - G40- , insert screws -3- with spread on locking agent - D 000 600 A2- and tighten to 10 Nm.



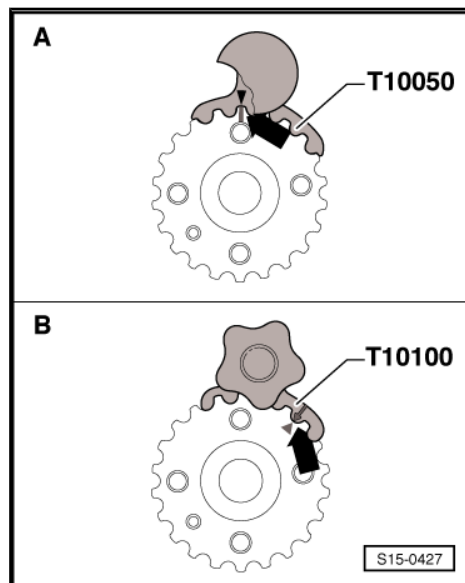
- Position hub onto camshaft.
- Tighten screw -1- to 100 Nm, use counterholder - T10051- to hold.



- First of all position camshaft and then also crankshaft on TDC for cylinder 1:
- For the camshaft, the cams of cylinder 1 must be pointing up evenly -arrows-...

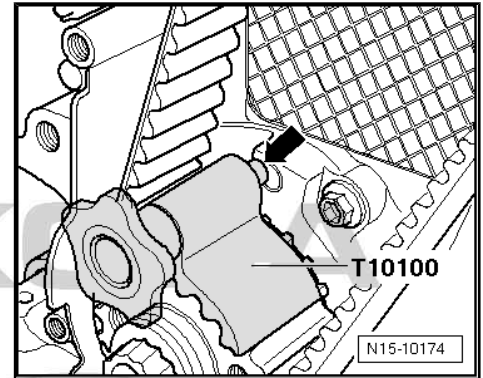


- ... and depending on the version, the crankshaft toothed belt sprocket must be locked using the crankshaft arrester - T10050- or crankshaft arrester - T10100- .



i Note

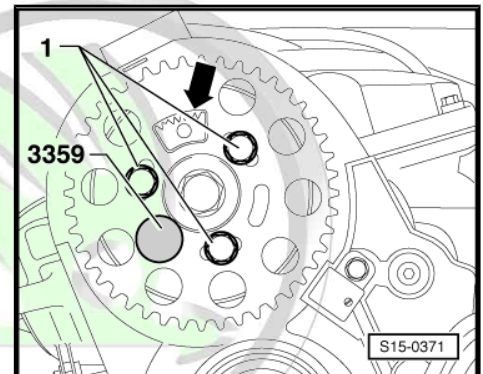
- ◆ *Markings on the toothed belt sprocket and on the crankshaft arrester must be in line with each other -arrow-.*
- ◆ *The pin on the crankshaft arrester -arrow- must engage into the hole in the sealing flange.*
- ◆ *The crankshaft arrester can only be fitted onto the serration of the toothed belt sprocket from the front side.*



- Push toothed belt sprocket onto the hub.
- The tooth segment -arrow- of the toothed belt sprocket must be at the top.
- Slightly screw in plug -1-.
- Lock hub with locking pin e. g. -3359 - .
- install (set the timing) ⇒ [page 38](#) .
- Install cylinder head cover ⇒ [page 83](#) .

Further installation occurs in reverse order to removal. Pay attention to the following:

- Checking the oil level ⇒ Maintenance ; Booklet Octavia II.



i Note

Change contaminated engine oil ⇒ Maintenance ; Booklet Octavia II. .

- Top up coolant ⇒ [page 143](#) .

1.8 Checking the compression pressure for engines with code BMM

Special tools and workshop equipment required

- ◆ Compression tester , e.g. -V.A.G 1763-
- ◆ Adapter e.g. -V.A.G 1381/12 -
- ◆ Flexible-head wrench e.g. -3220 -

Test conditions

- Engine oil temperature at least 30 °C.

Test sequence

- Remove engine cover ⇒ [page 13](#) .
- Detach central plug connection for unit injectors and edge connector for glow plugs.
- Unscrew all glow plugs with flexible-head wrench .



- Screw the adapter e.g. -V.A.G 1381/12 - into the relevant cylinder in place of the glow plug.
- Test compression pressure with compression tester , e.g. - V.A.G 1763- .



Note

Use of tester ⇒ Owner's Manual .

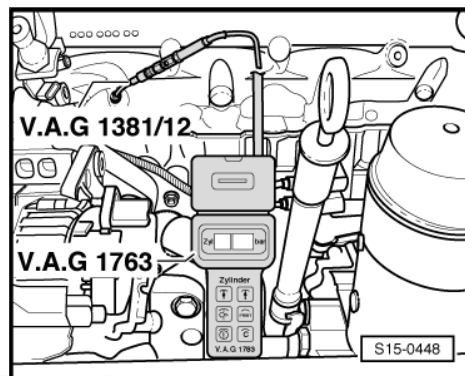
- The 2nd mechanic operates the starter until the tester no longer indicates a pressure rise.

Compression readings

New	Wear limit	Permissible difference between the cylinders
Overpressure	Overpressure	Overpressure
2,5...3,1 MPa	1.9 MPa	max. 0.5 MPa
25 ... 31 bar	19 bar	max. 5 bar

Perform after the compression pressure test:

- Install glow plugs and tighten to 15 Nm.
- Connect central plug connection for unit injectors and edge connector for glow plugs.
- Querying and erasing event memory of engine control unit
⇒ Vehicle diagnostic tester.



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2 Repairing Valve Gear

2.1 Summary of components for engines with code BKD, AZV



Note

- ◆ After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The valve lever with hydraulic valve clearance compensation must settle (otherwise the valves would strike the pistons).
- ◆ After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.
- ◆ Always replace gasket rings and seals.
- ◆ Removing and installing the tandem pump ⇒ [page 171](#).

1 - Holder for cable strip - 10 Nm

2 - 20 Nm

- ☐ Pay attention to sequence for loosening and tightening
⇒ [page 98](#)

3 - Valve-lever shaft

- ☐ for unit injector

4 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ Pay attention to sequence for loosening and tightening
⇒ [page 98](#)

5 - Cylinder head screw

- ☐ replace
- ☐ Pay attention to sequence for loosening and tightening
⇒ [page 77](#)

6 - Surface

- ☐ for cylinder head screws
- ☐ before installing the bearing frame, insert into the cylinder head

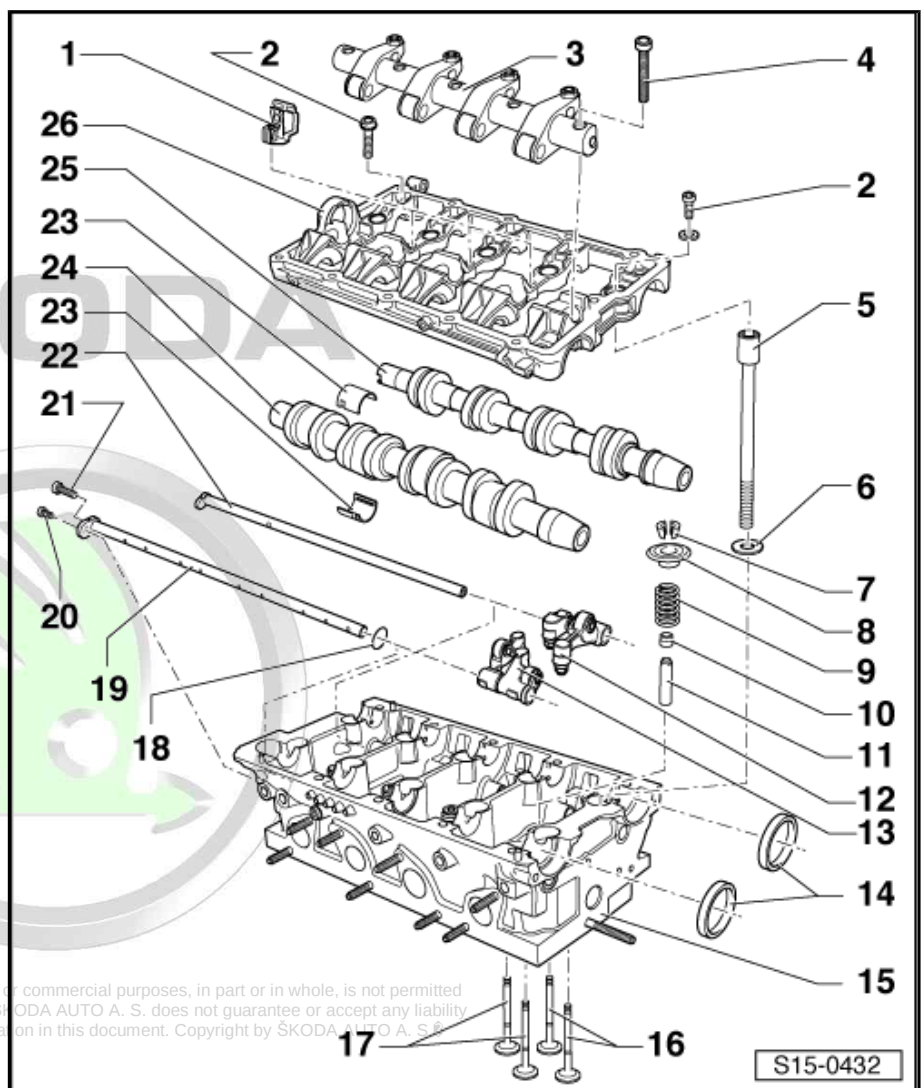
7 - Valve collets

8 - Valve spring plate

9 - Valve spring

10 - Valve stem gasket

- ☐ Replace ⇒ [page 108](#)





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11 - Valve guide

- ☐ not to be replaced
- ☐ Check ⇒ [page 121](#)

12 - Valve lever for inlet valve

- ☐ do not mix up used valve levers (mark)
- ☐ with hydraulic valve clearance compensation
- ☐ Check roller bearings for easy running and play
- ☐ Removing and installing ⇒ [page 105](#)

13 - Valve lever for outlet valve

- ☐ do not mix up used valve levers (mark)
- ☐ with hydraulic valve clearance compensation
- ☐ Check roller bearings for easy running and play
- ☐ Removing and installing ⇒ [page 105](#)

14 - Sealing rings

- ☐ Do not oil or grease the sealing lip
- ☐ Remove oil from camshaft pin before installation
- ☐ Before installation, cover up the groove for spring on camshaft cone with suitable adhesive tape
- ☐ Removing and installing ⇒ [page 97](#)

15 - Cylinder head

- ☐ Valve seats must not be reworked.

16 - Inlet valves

- ☐ Valve dimensions ⇒ [page 110](#)

17 - Outlet valves

- ☐ Valve dimensions ⇒ [page 110](#)

18 - O-ring

- ☐ replace

19 - Valve lever pin for outlet valves

- ☐ Outlet side
- ☐ Removing and installing ⇒ [page 105](#)

20 - 10 Nm

21 - Screw plug - 10 Nm

- ☐ replace

22 - Valve lever pin for inlet valves

- ☐ Inlet side
- ☐ Removing and installing ⇒ [page 105](#)

23 - Bearing shell

- ☐ do not mix up used bearing shells (mark)
- ☐ ensure the retaining lugs are correctly located in the bearing caps and in the cylinder head

24 - Exhaust camshaft

- ☐ Inspecting axial play ⇒ [page 97](#)
- ☐ Removing and installing ⇒ [page 98](#)

25 - Inlet camshaft

- ☐ Inspecting axial play ⇒ [page 97](#)
- ☐ Removing and installing ⇒ [page 98](#)

26 - Bearing frame

- ☐ Pay attention to sequence for loosening and tightening ⇒ [page 98](#)

- ❑ install with silicone sealant - D 176 501 A1-

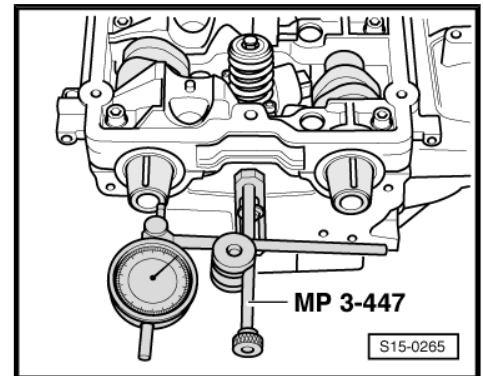
2.2 Checking the axial play of the camshafts for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Dial gauge

Test sequence

- Carry out measurement with removed valve levers and installed bearing bush.
- Wear limit: max. 0,15 mm



2.3 Replacing the sealing rings for camshafts for engines with code BKD, AZV

Special tools and workshop equipment required

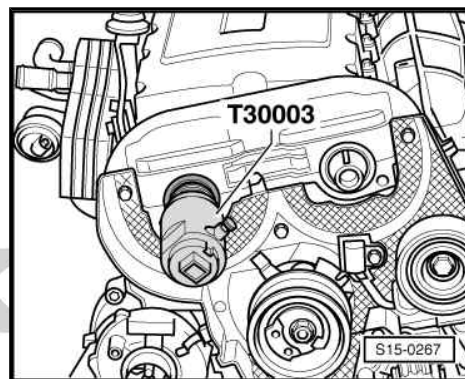
- ◆ Insertion tool - MP 1-214 (10-203)-
- ◆ Sealing ring extractor - T30003 (3240)-
- ◆ Counterholder - T10051 -
- ◆ Extractor - T10052-
- ◆ Screw M12 x 1.5 x 65 or screw M12 x 1.5 x 75 with insertion tool - MP 1-214 (10-203)- with spacer 10 mm

Removing

- Cylinder head fitted on engine.
- Remove toothed belt ➔ [page 26](#) .
- Remove camshaft sprockets and remove hubs ➔ [page 27](#) .



- Position the inner part of the sealing ring extractor - T30003- so that it is flush with the outer part, and lock with the knurled screw.
- Oil the thread head of the gasket ring extractor, position and forcibly screw as far as possible into the sealing ring of the exhaust camshaft.
- Release knurled screw and turn the inner side against the camshaft until the gasket ring is pulled out.
- Clamp gasket ring extractor into the vice and remove gasket ring with pliers.
- Clean the contact and sealing surfaces.
- Remove the sealing ring of the intake camshaft in the same way.



Installing

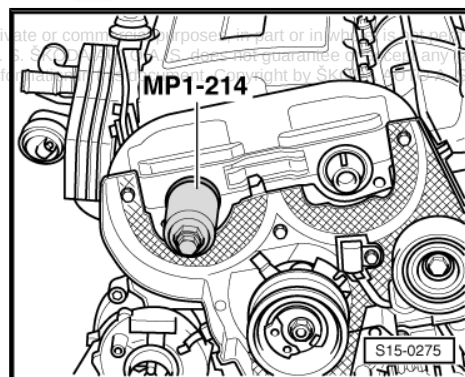
Installation occurs in reverse order to removal. Pay attention to the following:



Note

The sealing lips of the sealing rings must not be additionally oiled or greased.

- Use a clean cloth to remove oil residues on the camshaft pins.
- Cover up the groove on the exhaust camshaft cone with adhesive tape and carefully push the sealing ring onto the camshaft.
- Press in the sealing ring up to the stop using the thrust piece of the insertion tool - MP 1-214- and screw M12 x 65.
- Install the sealing ring of the intake camshaft in the same way.
- Install hub and camshaft sprockets ⇒ [page 23](#) .
- install (set the timing) ⇒ [page 26](#) .



2.4 Removing and installing camshafts for engines with code BKD, AZV

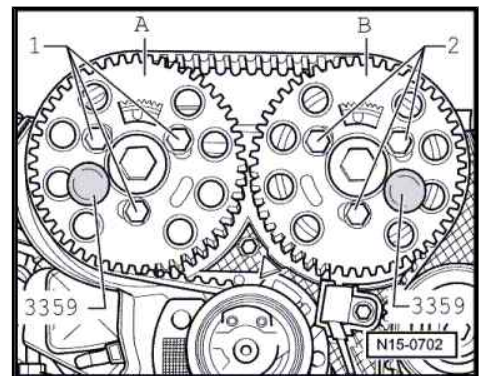
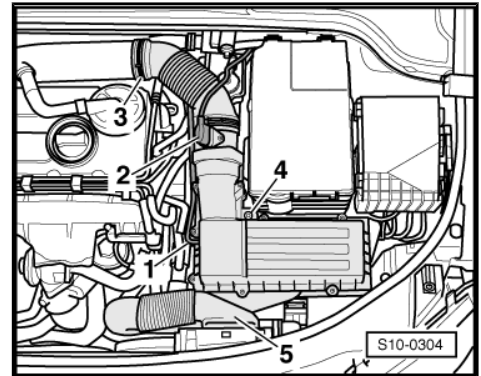
Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Counterholder - T10051-
- ◆ Extractor - T10052-
- ◆ locking pin - 3359- or locking pin - MP 1-301-
- ◆ Surround - T10262-
- ◆ Dial gauge
- ◆ Silicone sealant - D 176 501 A1-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.

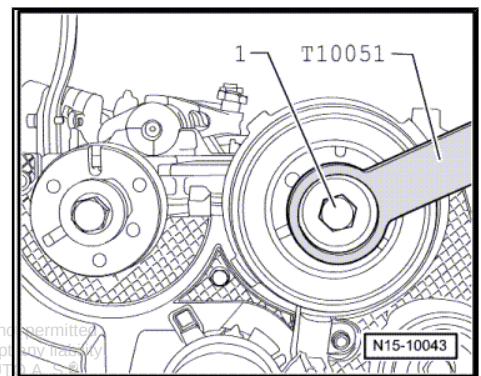
- ◆ Cleaning and degreasing agent, e.g. - D 000 401 04-
- ◆ Protective goggles
- ◆ Protective gloves

Removing

- Cylinder head fitted on engine.
- Remove engine cover ⇒ [page 13](#) .
- Remove air filter with air guide hose and intake hose ⇒ [page 208](#) .
- Remove battery ⇒ Electrical System ⇒ Rep. gr. 27 .
- Remove the bulkhead plenum chamber ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove radiator for exhaust gas recirculation with radiator flap from bracket ⇒ [page 241](#) . The coolant hoses remain connected.
- Remove brackets for exhaust gas recirculation radiator flap and exhaust gas recirculation radiator.
- Remove toothed belt off camshaft sprockets ⇒ [page 26](#) .
- Remove locking pins for diesel injection pump - 3359- .
- Unscrew screws -1- and -2- of the camshaft sprockets.
- Remove camshaft sprockets from the hub.



- Loosen fixing screw -1- of the hub. Use counterholder - T10051- for this purpose.
- Unscrew the fixing screw of the hub by approx. 2 turns.



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- Position the extractor - T10052- and align it with the hub bores.
- Tighten fixing screws -1-.
- Put the hub under tension by uniformly tightening the screw -2- until the hub is released from the camshaft cone.



Note

When doing so, counterhold the hexagon on the extractor using the SW 30 wrench.

- Remove hub from cone of camshaft.
- When doing so, counterhold the hexagon on the extractor using the SW 30 wrench.
- Remove cylinder head cover ➤ [page 72](#) .
- Remove tandem pump ➤ [page 171](#) .



Note

The hoses can remain connected to the tandem pump.

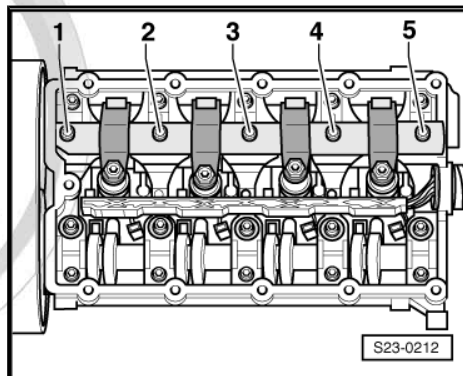
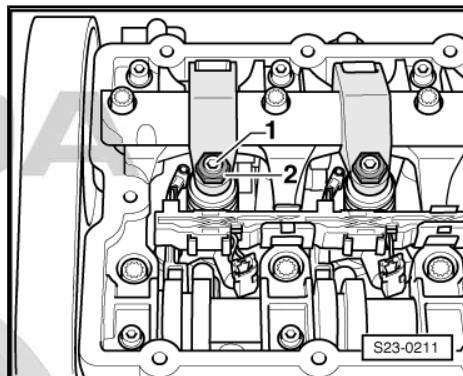
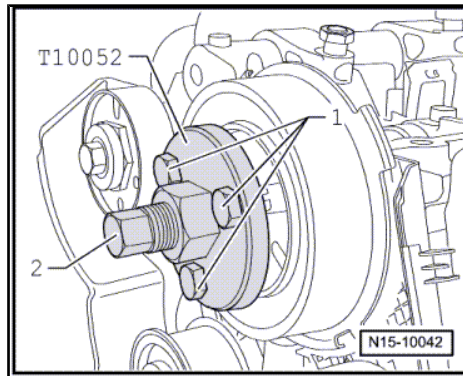
- Undo the locknuts -2- of the adjusting screws -1- for all unit injectors and unscrew adjusting screws until the respective valve lever is resting on the spring plate of the unit injector.



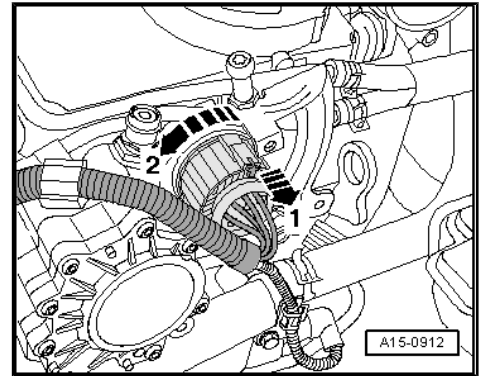
Note

Do not remove the screws from the valve lever shaft in order that the individual parts remain attached to the valve lever shaft. Mark the assignment of the valve lever if necessary.

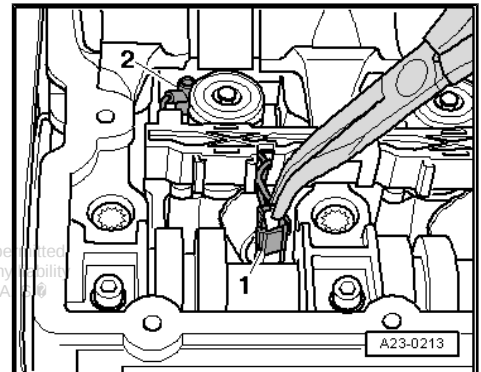
- Remove screws -1-, -3- and -5-.
- Undo screws -2- and -4- and alternately remove in several stages. Then remove the valve-lever shaft with valve levers.
- Unscrew the top fixing screws on the rear toothed belt guard.



- Pull the release mandrel in -arrow direction 1- and open the knurled nut in -arrow direction 2-.
- Disconnect the central plug connection for unit injectors and glow plugs and uncover the wiring harness.



- Disconnect connectors -1- for unit injectors while pressing the locking pins.



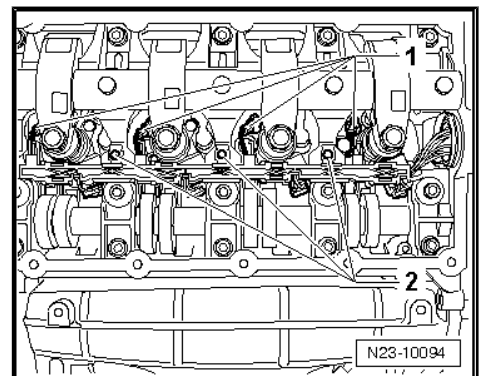
- Unplug connector -1- from the glow plugs.



Caution

The installation / removal of the wiring harness must only be carried out by unscrewing/screwing on the clamps. By removing the cable guide from the clamps, the clamps will be bent apart and the larger clearance can lead to cable breakage.

- Fixing screws -2-, unscrew the stainless steel clamps (10 Nm) and place the wiring harness down.
- Evenly loosen and remove the remaining 15 screws of the bearing bush from outside to inside.
- Remove jacking screws SW 15 of the frame -T10262- by turning anti-clockwise to the stop.





- Place frame -T10262- on the bearing bush as shown and tighten fixing screws SW 10 to 10 Nm.
- Screw in the jacking screws by hand until they touch the cylinder head bolts.
- Evenly screw in the jacking screws in the sequence -1...4- shown on the screw heads until the bearing bush has detached from the cylinder head.
- Remove bearing frame.



Note

- ♦ *Ensure that the bearing shells of the camshaft are not mixed up.*
- ♦ *Mark assignment of the camshaft bearing shells with waterproof marker on the reverse side.*
- Take out camshafts.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:



WARNING

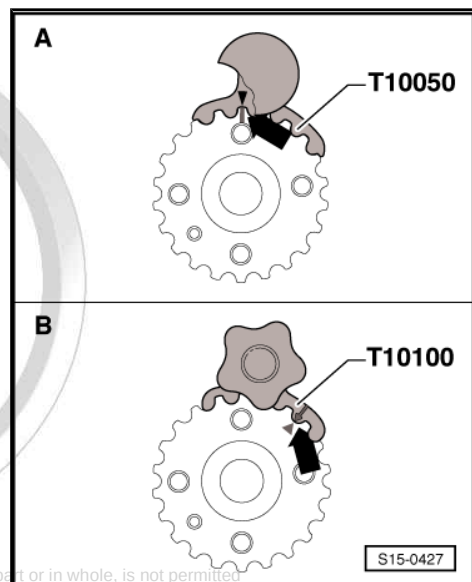
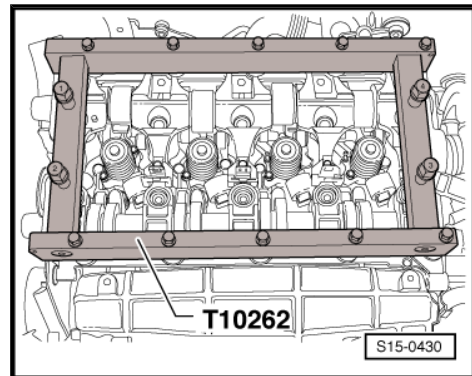
Wear protective gloves and goggles when working with gasket remover and degreasing agent!

- Remove residual sealant on the bearing frame and cylinder head using a chemical sealant remover.
- Clean sealing surfaces, they must be free of oil and grease.
- Check if the crankshaft is on TDC for cylinder 1.
- Depending on the version, lock the crankshaft toothed belt sprocket to TDC for cylinder 1 using either crankshaft arrester - T10050- or crankshaft arrester - T10100- .

Distinguishing the crankshaft toothed belt sprocket:

A = original version of toothed belt sprocket with circular tooth flanks, rectangular TDC marking on tooth in 12 o'clock position for cylinder 1 - use crankshaft arrester - T10050 -

B = new version of toothed belt sprocket with elliptical tooth flanks, triangular TDC marking on the sprocket in the sprocket in 1 o'clock position - use crankshaft arrester - T10100-

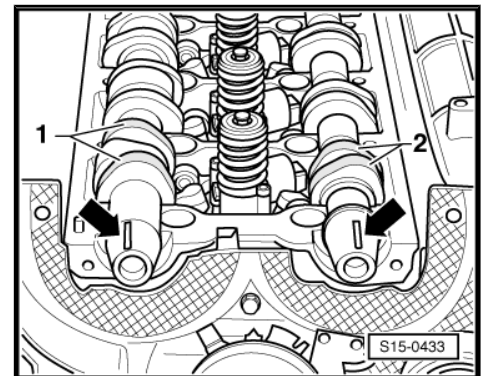
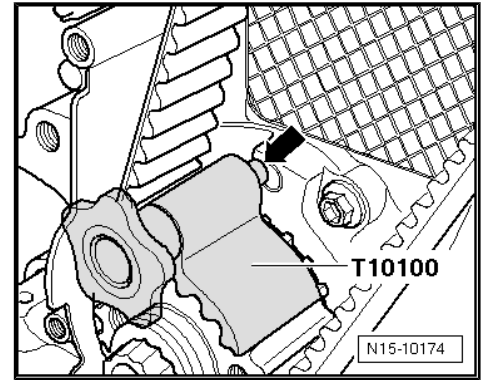


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Note

- ◆ *Markings on the toothed belt sprocket and on the crankshaft arrester must be in line with each other -arrow-.*
 - ◆ *The pin on the crankshaft arrester -arrow- must engage into the hole in the sealing flange.*
 - ◆ *The crankshaft arrester can only be fitted onto the toothed belt sprocket from the front side of the serration.*
 - ◆ *Ensure that the used camshaft bearing shells are not mixed up (pay attention to marking).*
 - ◆ *When installing the camshafts, make sure that the bearing shell retaining lugs are correctly positioned in the bearing bush and cylinder head.*
- Grease the running surfaces of the camshafts and bearings.
 - Insert camshafts into the TDC for cylinder 1:
 - The cams -1- and -2- for cylinder 1 must be pointing upwards on both camshafts.
 - The grooves -arrows- in the camshafts must also point upwards.



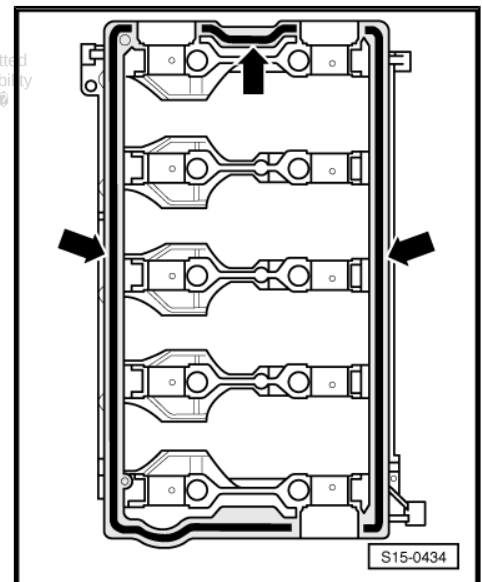
- Cut the nozzle tube at the front marking ($\varnothing$ of the nozzle approx. 2 mm) and apply silicone sealant - D 176 501 A1- to the clean sealing surface of the bearing bush -arrows-.
- Thickness of sealant bead: 2 mm.



Note

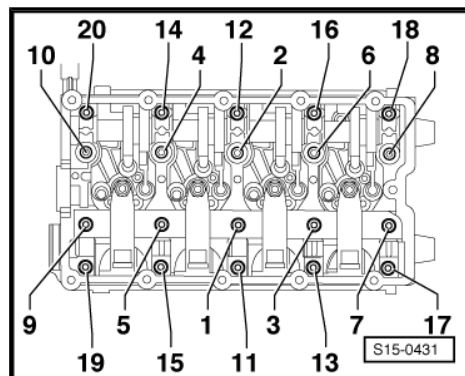
The bearing frame must be installed within 5 minutes after applying the silicone sealant.

- Place bearing bush with inserted bearing shells onto the dowel pins of the cylinder head.

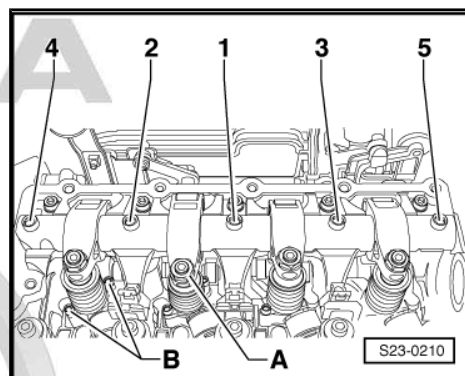




- Replace screws -1, 3, 5, 7, 9-.
- Tighten screws -1 ... 20- evenly and in the specified order from inside to outside. Tightening torque 20 Nm.
- Insert valve-lever shaft.



- Continue turning in valve-lever shaft screws -1 ... 5- by 90° in the specified order (1/4 turn).
- Insert central plug connection for unit injectors and for glow plugs ⇒ [page 206](#) .
- Install camshaft sealing rings ⇒ [page 97](#) .
- Install tandem pump ⇒ [page 171](#) .
- Install hub and camshaft sprockets ⇒ [page 23](#) .
- install toothed belt and set the timing ⇒ [page 26](#) .



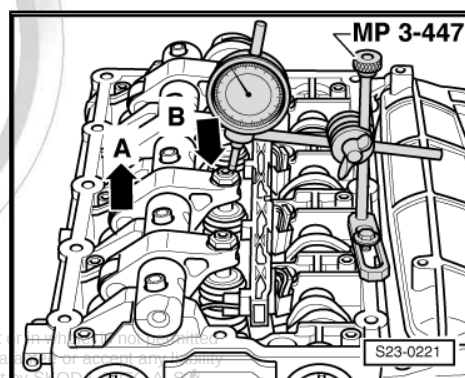
- Place a dial gauge on the adjusting screw of the unit injector.



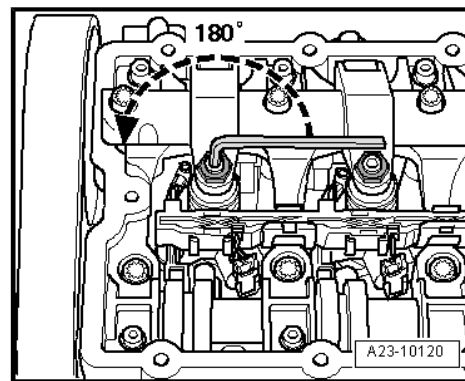
Caution

The engine may only be turned in the direction of engine rotation (clockwise) at the crankshaft.

- Turn the crankshaft in the running direction of the engine until the roller of the valve lever is on the drive cam tip.
- Valve lever roller side -arrow A- is at the highest point.
- Dial gauge -arrow B- is at the lowest point.
- Remove the dial gauge.
- Turn the adjusting screw into the valve lever until clear resistance can be felt (the unit injector is at the stop).



- Turn the adjusting screw in the opposite direction from the stop by about 180°
- Firmly hold the adjusting screw in this position and tighten the locknut to 30 Nm.
- Install cylinder head cover ⇒ [page 69](#) .
- Install battery ⇒ Electrical System ⇒ Rep. gr. 27 .
- Install the mounting bracket and radiator for exhaust gas recirculation with radiator flap ⇒ [page 241](#) .
- Install bulkhead plenum chamber and plenum chamber cover ⇒ Body Work ⇒ Rep. gr. 66 .



i Note

- ◆ *After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The valve lever with hydraulic valve clearance compensation must settle (otherwise the valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*

2.5 Removing and installing valve levers for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Extractor - T10133/3-

i Note

- ◆ *Replace O-rings.*
- ◆ *Do not mix up the old valve levers*

Remove valve levers for outlet valves

- Remove the camshafts ⇒ [page 98](#) .
- Drain coolant ⇒ [page 135](#) .
- Remove the connecting pipe between the mechanical exhaust gas recirculation valve and the flap of the radiator for exhaust gas recirculation ⇒ [page 241](#) .
- Remove the connecting piece for coolant from the cylinder head ⇒ [page 131](#) .

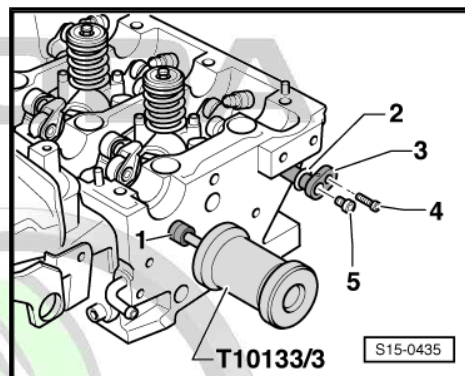


- Mark assignment of valve levers to aid reinstallation
- Remove screws -4- and -5-.
- Extract pin -3- on the outlet side of the valve levers using extractor - T10133/3- so that it is removed from the cylinder head, and remove valve lever.



Caution

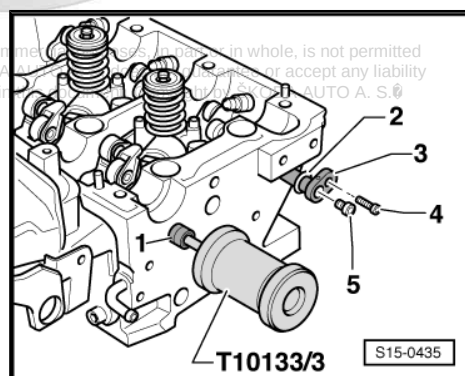
When loosening the screw plug -5-, the valve lever pin on the outlet side may twist against the mounting plate. If a deformation is noticeable during the visual inspection of the thread in the valve lever pin, this pin must not be used any more because the oil openings for the valve lever will no longer match. This may cause seizure.



Install valve levers for outlet valves

Installation occurs in reverse order to removal. Pay attention to the following:

- Before installing, wet the valve lever bearings with clean engine oil.
- Slide new O-ring onto the valve lever pin.
- Insert the valve lever pin into the cylinder head and insert the valve levers one after the other.
- Tighten fixing screw -4- to 10 Nm.
- Replace screw plug -5- and tighten the new one to 10 Nm.
- Install connecting piece for coolant to the cylinder head ⇒ [page 131](#).
- Install the connecting pipe between the mechanical exhaust gas recirculation valve and the flap of the radiator for exhaust gas recirculation ⇒ [page 242](#).
- Install camshafts ⇒ [page 98](#).
- Top up coolant ⇒ [page 135](#).



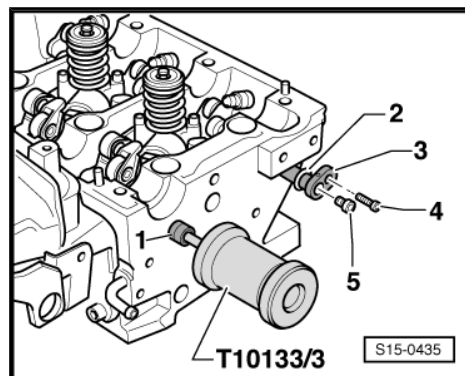
Remove valve levers for inlet valves

- Remove the camshafts ⇒ [page 98](#).
- Mark assignment of valve levers to aid reinstallation
- Extract the pin on the inlet side of the valve levers using extractor - T10133/3- so that they are removed from the cylinder head, and remove valve levers.

Install valve levers for inlet valves

Installation occurs in reverse order to removal. Pay attention to the following:

- Before installing, wet the valve lever bearings with clean engine oil.
- Insert the valve lever pin into the cylinder head and insert the valve levers one after the other.
- The valve lever pin must be flush with the cylinder head.
- Install camshafts ⇒ [page 98](#).



2.6 Checking the hydraulic supporting elements for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Feeler gauges

Note

- ◆ *The hydraulic supporting elements pressed into the valve levers cannot be repaired.*
- ◆ *Irregular valve noises when starting engine are normal.*

Test sequence

- Start engine and allow to run until the radiator fan starts. Increase speed to about 2500 rpm for 2 minutes and undertake a test drive if necessary.

Note

If there are irregular valve noises which disappear after a long drive but keep reappearing on short journeys then the return-flow check tube is defective. Fitting location: in the oil filter holder. The return-flow check tube cannot be replaced individually.

If the valves are still making loud noises, determine the defective hydraulic supporting element as follows:

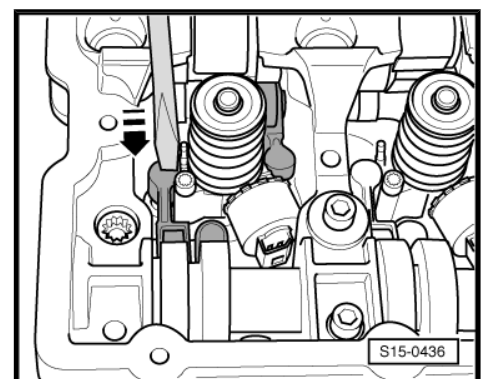
- Remove cylinder head cover ⇒ [page 72](#) .
- Turn the crankshaft so that the cams of the supporting element being tested are pointing upwards.
- ◆ For vehicles with manual transmission, push the vehicle forward with the 4th gear engaged and the ignition switched off.
- ◆ For vehicles with automatic transmission, turn the crankshaft at the central screw.
- Press the valve lever downwards using a screwdriver -arrow- and measure the clearance between the cam and roller of the valve lever.

If a 0.20 mm feeler gauge can be fitted between the cam and the valve lever roller:

- Replace valve lever with hydraulic valve clearance compensation; to do so, remove valve lever ⇒ [page 98](#) .

Note

- ◆ *After installing the camshafts, the engine must not be started for about 30 minutes. The valve lever with hydraulic valve clearance compensation must settle (otherwise the valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*



2.7 Replacing valve stem seals for engines with code BKD, AZV

- Cylinder head fitted on engine.

Special tools and workshop equipment required

- ♦ Extractor - MP 1-230 (3364)-
- ♦ valve stem seal insertion tool - MP 1-233 (3365)-
- ♦ Disassembly and assembly device for valve collets - VAS 5161-
- ♦ Guide plate for 2.0 TDI engine - VAS 5161/21 -



Note

- ♦ *With cylinder head removed:*
- ♦ *Remove glow plugs from the cylinder head ⇒ [page 250](#) .*
- ♦ *Remove unit injectors from the cylinder head ⇒ [page 210](#) .*
- ♦ *Position cylinder head on a suitable flat valve supporting plate.*

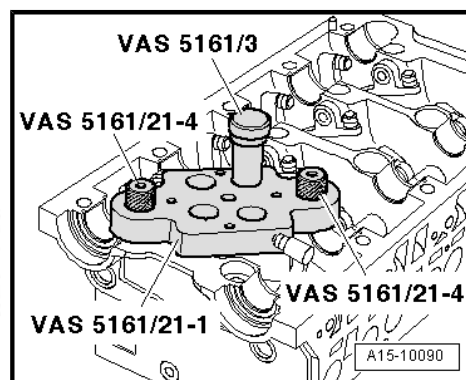
Removing

- Remove the camshafts ⇒ [page 98](#) .



Note

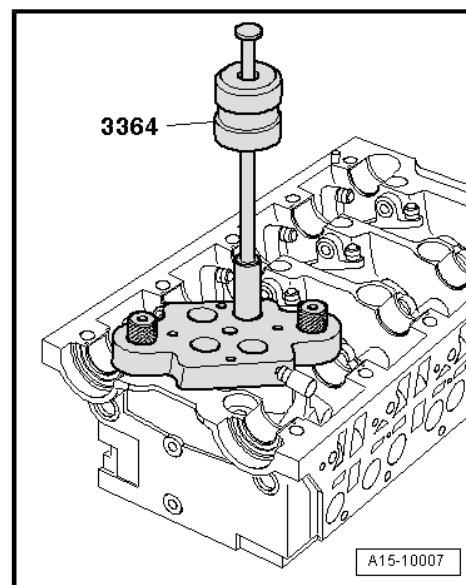
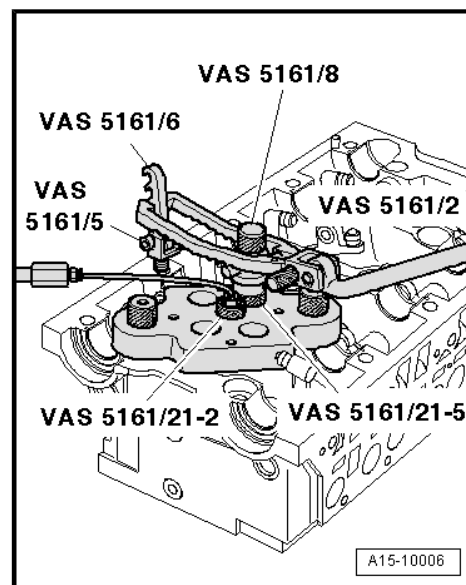
- ♦ *Ensure that the bearing shells of the camshaft are not mixed up.*
- ♦ *Mark assignment of the camshaft bearing shells with waterproof marker on the reverse side.*
- Remove camshaft bearing shells from the cylinder head.
- Remove the unit injectors ⇒ [page 210](#) .
- Put the piston of the relevant cylinder at “bottom dead centre”.
- Position the guide plate - VAS 5161/21-1- onto the cylinder head.
- Attach the guide plate - VAS 5161/21-1- with the knurled screws - VAS 5161/21-4- .
- Insert the impact mandrel - VAS 5161/3- into the guide plate and knock off the tightly fitted valve collets using a plastic hammer.



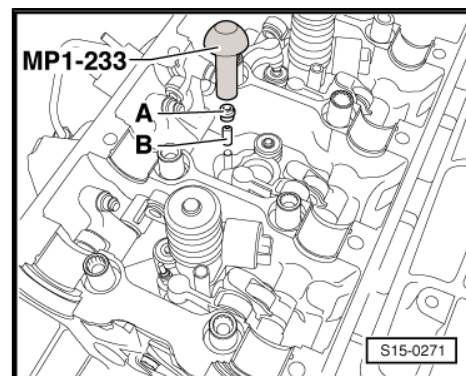
- Screw the adapter - VAS 5161/21-2- into the guide plate by hand.
- Attach the detent part - VAS 5161/6- to the cylinder head using the support fork - VAS 5161/5- .
- Push the spacer - VAS 5161/21-5- onto the assembly cartridge - VAS 5161/8- .
- Insert the assembly cartridge - VAS 5161/8- into the guide plate - VAS 5161/21-1- .
- Connect the adapter - VAS 5161/21-2- to the compressed air with a commercially available intermediate piece and apply constant pressure.
- Minimum pressure: 0.6 MPa (6 bar) overpressure.
- Hook the pressure fork - VAS 5161/2- into the detent part - VAS 5161/6- .
- Press the assembly cartridge - VAS 5161/8- down while simultaneously turning the knurled screw on the assembly cartridge to the right until the nibs engage into the valve collets.
- Slightly move back and forward the knurled screw. This pushes the valve collets apart and into the assembly cartridge.
- Release the pressure fork - VAS 5161/2- .
- Remove the assembly cartridge - VAS 5161/8- with spacer - VAS 5161/21-5- , valve spring plate and valve spring.
- Pull off valve stem seals with the extractor - 3364- .

Installing

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- Place the supplied plastic sleeve -B- on the respective valve stem. This will prevent any damage to the new valve stem seal -A-.
- Insert the new valve stem seal into the insertion tool - MP 1-233- .
- Oil the sealing lip of the valve stem seal and carefully slide onto the plastic sleeve -B-.
- Carefully press the valve stem seal with the valve stem seal insertion tool - MP 1-233- onto the valve guide.
- Remove the plastic sleeve -B- again.
- Insert the valve spring and the valve spring retainer.





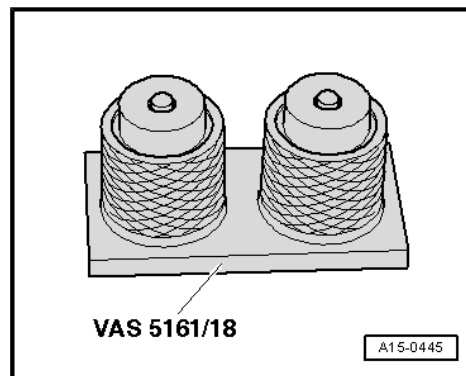
- If the valve collets were removed from the assembly cartridge - VAS 5161/8- , they must first be inserted into the insertion device for valve collets -VAS 5161/18- .



Note

The large diameter of the valve collets points to the top.

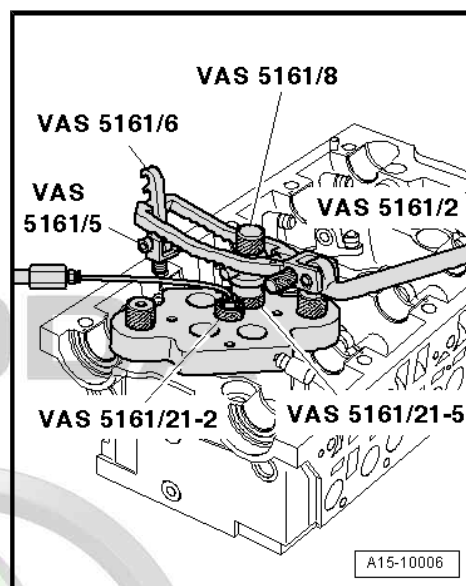
- Press the assembly cartridge onto the insertion device - VAS 5161/18- from above and lift up the valve collets.



- Insert the assembly cartridge - VAS 5161/8- into the guide plate.
- Push the pressure fork - VAS 5161/2- down and turn the knurled screw on the assembly cartridge to and fro thereby pulling it upwards. This inserts the valve collets.
- Release the pressure fork - VAS 5161/2- on tightened knurled screw.

The valve stem seal is removed and installed on the other valves in the same way.

- Install the unit injectors ➔ [page 210](#) .
- Install camshafts ➔ [page 98](#) .

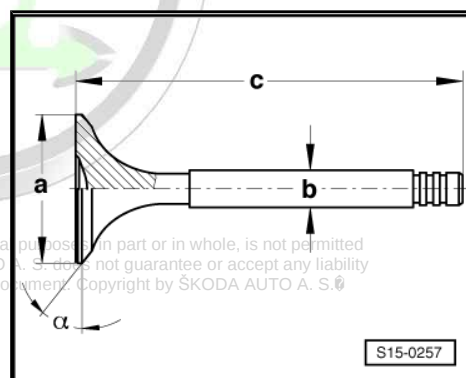


Note

- ◆ *After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The valve lever with hydraulic valve clearance compensation must settle (otherwise the valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*

2.8 Valve dimensions for engines with code BKD, AZV

Dimension		Inlet valve	Exhaust valve
Ø a	mm	29.20	25.50
Ø b	mm	5.975	5.965
c	mm	87.80	87.50
α	°	45	45



Note

Valves must not be reworked. Only lapping-in is permitted.

2.9 Summary of components for engines with code BMM



Note

- ◆ After installing the camshaft, the engine must not be cranked or started for about 30 minutes. The hydraulic bucket tappets must settle (otherwise valves would strike the pistons).
- ◆ After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.
- ◆ Always replace gasket rings and seals.
- ◆ Removing and installing the tandem pump ➔ [page 171](#).

1 - Cylinder head

2 - Bearing shell

- ☐ Check fitting position
- ☐ do not mix up already used bearing shells (mark)
- ☐ ensure the retaining lugs are correctly located in the bearing caps and in the cylinder head

3 - Camshaft

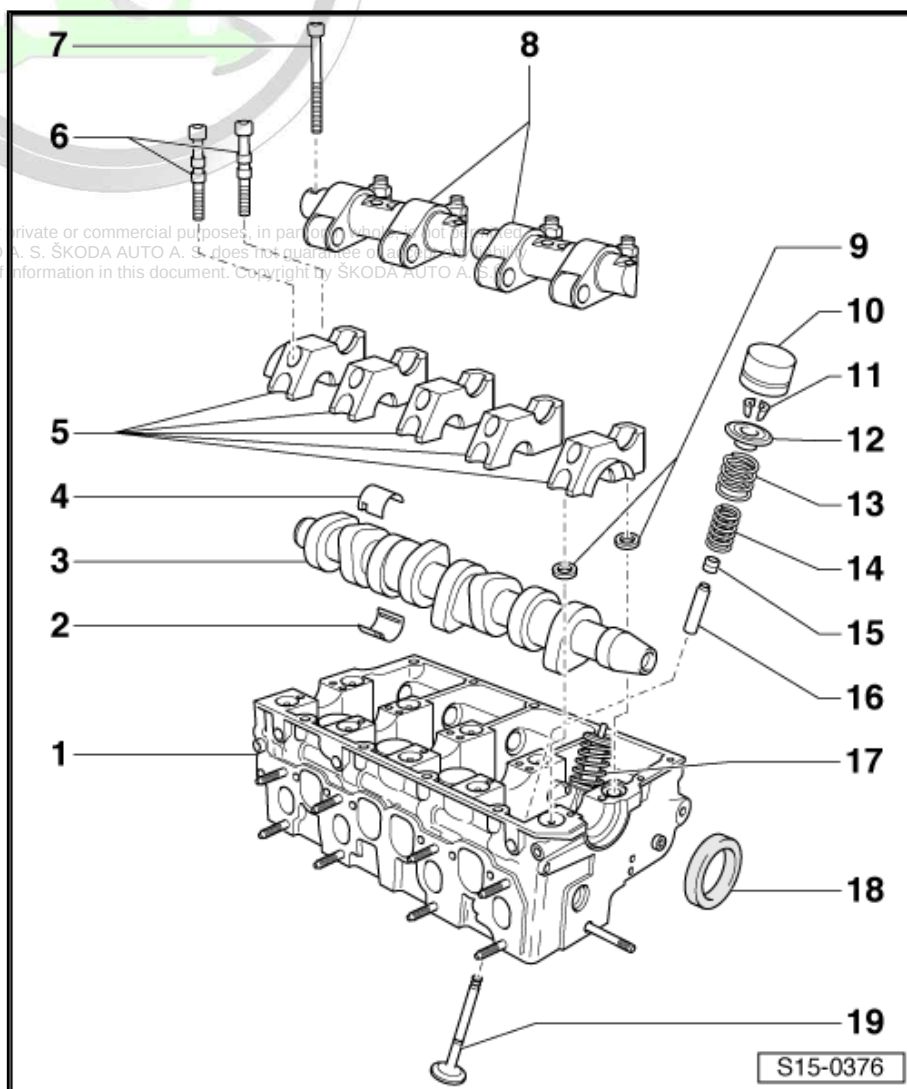
- ☐ Radial play wear limit: 0.11 mm
- ☐ Knock: no more than 0.04 mm
- ☐ Inspecting axial play ➔ [page 112](#)
- ☐ Removing and installing ➔ [page 115](#)

4 - Bearing shell

- ☐ Check fitting position
- ☐ do not mix up already used bearing shells (mark)
- ☐ ensure the retaining lugs are correctly located in the bearing caps and in the cylinder head

5 - Bearing caps

- ☐ Removing and installing ➔ [page 115](#)
- ☐ Seal bearing covers 1 and 5 with sealant - D 454 300 A2 -



6 - 8 Nm + torque a further 90° (1/4 turn)

- ☐ replace

7 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ Pay attention to sequence for loosening and tightening ➔ [page 115](#)

8 - Valve-lever shaft

- ☐ do not mix up (mark)



- ☐ Pay attention to sequence for loosening and tightening ⇒ [page 115](#)

9 - Washer

- ☐ for cylinder head screws
- ☐ before installing the bearing caps, insert into the cylinder head

10 - Hydraulic bucket tappets

- ☐ Check ⇒ [page 118](#)
- ☐ Removing and installing ⇒ [page 119](#)
- ☐ do not mix up (mark)
- ☐ lay aside with contact surface facing down
- ☐ before installing check axial play of the camshaft ⇒ [page 112](#)
- ☐ oil contact surfaces

11 - Valve collets

12 - Valve spring plate

13 - Valve spring outside

- ☐ Removing and installing ⇒ [page 119](#)

14 - Valve spring inside

- ☐ Removing and installing ⇒ [page 119](#)

15 - Valve stem gasket

- ☐ Replace ⇒ [page 119](#)

16 - Valve guide

- ☐ Check ⇒ [page 121](#)

17 - The unit injector

- ☐ Removing and installing ⇒ [page 221](#)

18 - Sealing ring

- ☐ Replace ⇒ [page 113](#)

19 - Valve

- ☐ Valve dimensions ⇒ [page 121](#)
- ☐ do not rework, only grinding in is permissible

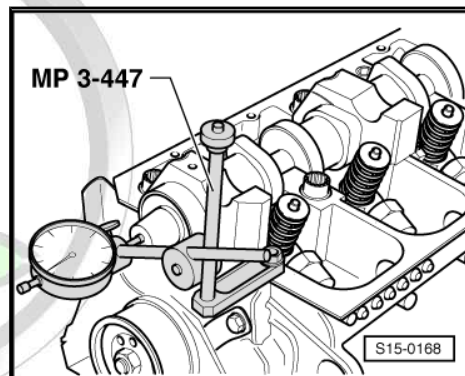
2.10 Checking the axial play of the camshaft for engines with code BMM

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Dial gauge

Test sequence

- Perform measurement with the bucket tappets removed and the first and last bearing cap fitted.
- Wear limit: max. 0,15 mm



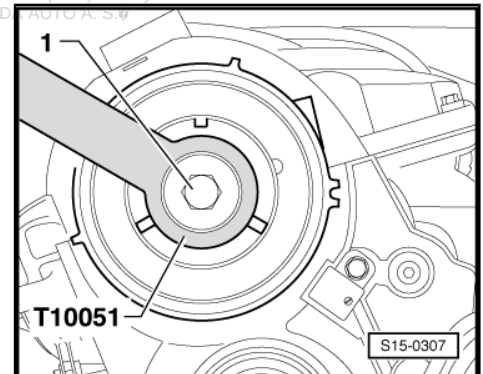
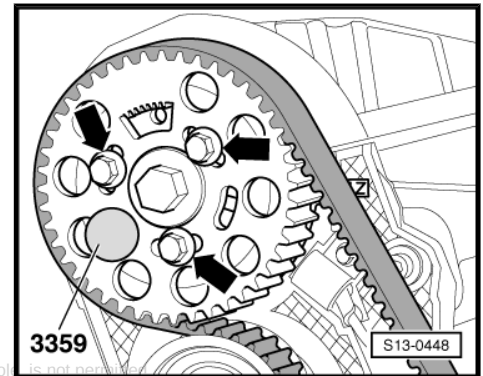
2.11 Replacing the sealing ring for camshaft for engines with code BMM

Special tools and workshop equipment required

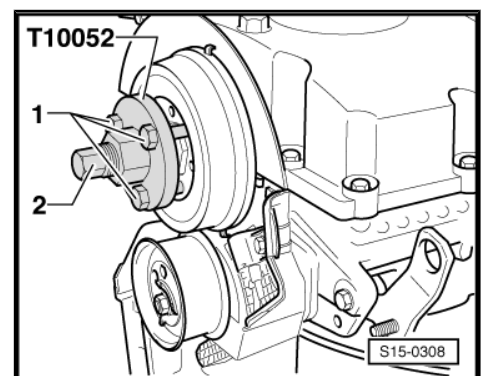
- ◆ Insertion tool - MP 1-214 (10-203)-
- ◆ Sealing ring extractor - T30003 (3240)-
- ◆ Counterholder - T10051-
- ◆ Extractor - T10052-
- ◆ Screw M12 x 65

Removing

- Cylinder head attached at engine.
- Remove toothed belt ⇒ [page 38](#) .
- Remove the locking pin - 3359- .
- Remove the screws from the toothed belt pulley -arrows- and the camshaft sprocket from the hub.
- Loosen the fixing bolt of the hub -1- by approx. 2 turns; use the counterholder - T10051- to do so.



- Position the extractor - T10052- and screw the screws -1- into the hub.
- Pull off the hub; to do so, counterhold the hexagon wrench (SW30) of the extractor and screw in the screw -2-.
- Position the inner part of the sealing ring extractor - T30003- so that it is flush with the outer part, and lock with the knurled screw.





- Oil the thread head of the gasket ring extractor, position and forcibly screw into the gasket ring of the camshaft as far as possible.
- Release knurled screw and turn the inner side against the camshaft until the gasket ring is pulled out.
- Clamp gasket ring extractor into the vice and remove gasket ring with pliers.
- Clean the contact and sealing surfaces.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

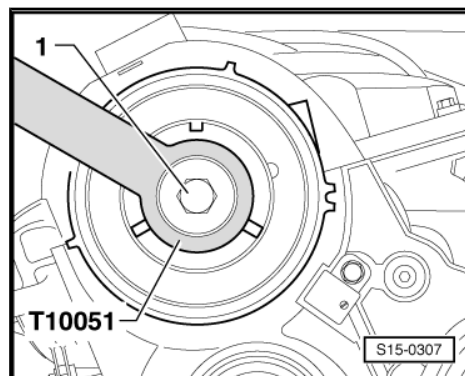
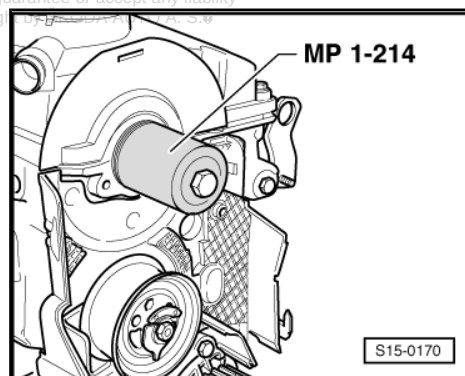
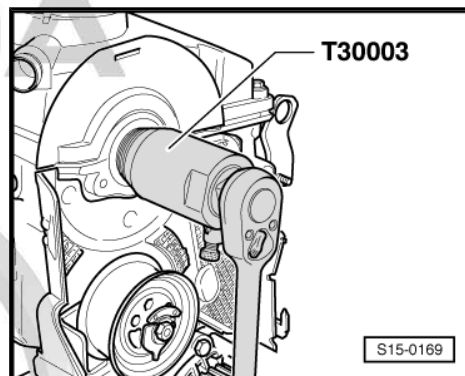


Note

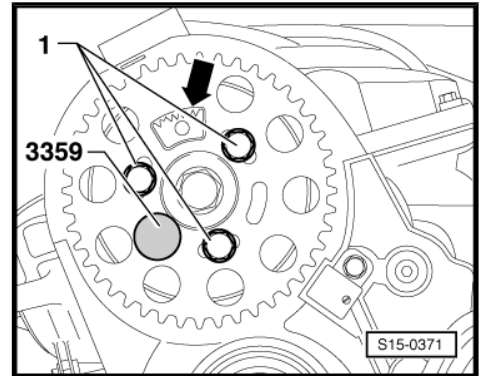
The sealing lip of the gasket ring must neither be oiled nor greased additionally.

- Remove oil residue from the camshaft stud with a clean cloth.
- Cover slot on the camshaft cone with adhesive tape and carefully push the sealing ring onto the camshaft.
- Press in the sealing ring up to the stop using the thrust piece of the insertion tool - MP 1-214- and screw M12 x 65.
- Position hub onto camshaft.

- Tighten screw -1- to 100 Nm, use counterholder - T10051- to hold.



- Push camshaft sprocket onto the hub.
- The tooth segment -arrow- of the toothed belt sprocket must be at the top.
- Slightly screw in plug -1-.
- Lock hub with locking pin e. g. - 3359- .
- install (set the timing) ➔ [page 38](#) .



2.12 Removing and installing the camshaft for engines with code BMM

Special tools and workshop equipment required

- ◆ Counterholder - T10051-
- ◆ Extractor - T10052-
- ◆ Silicone sealant - D 176 404 A2-
- ◆ Sealant - D 454 300 A2-

Removing

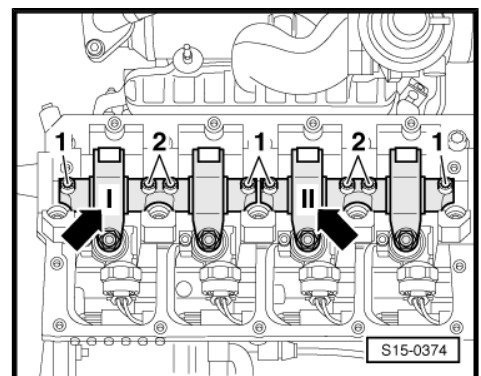
- Cylinder head attached at engine.
- Remove toothed belt ➔ [page 38](#) .
- Remove tandem pump ➔ [page 171](#) .



Note

The hoses can remain connected to the tandem pump.

- Remove camshaft sprocket and remove hubs ➔ [page 113](#) .
- Remove cylinder head cover ➔ [page 83](#) .
- Mark the valve-lever shafts with waterproof felt-tip pen to avoid mixing them up and to avoid having to perform a basic setting of the unit injectors -arrows-.
- First release the two outer -1- and then the inner screws -2- of the valve-lever shafts.
- Remove valve-lever shafts.





- First remove bearing caps -1-, -3- and -5-.
- Then release bearing caps -2- and -4- alternately and cross-wise.



Note

- ◆ Ensure that the bearing shells of the camshaft are not mixed up.
- ◆ Mark assignment of the bearing shells for the camshaft with waterproof marker on the reverse side.

- Take out camshafts.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

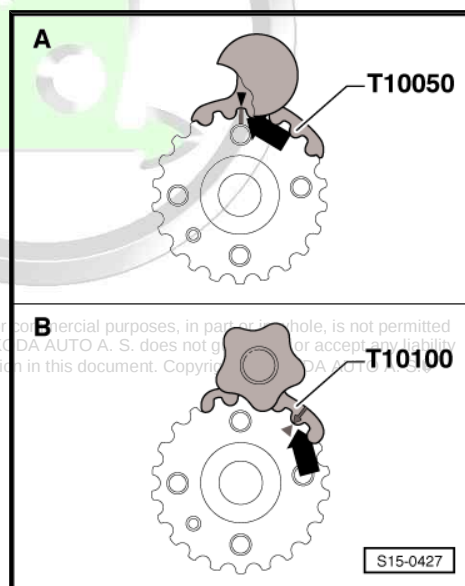
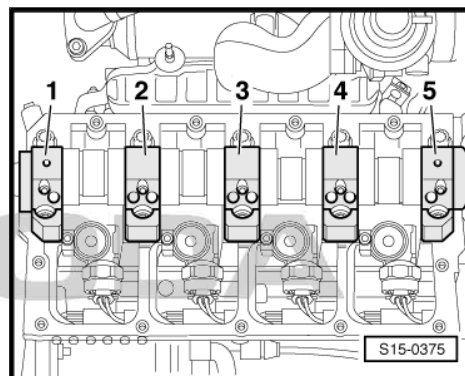
- Check if the crankshaft is on TDC for cylinder 1.
- Depending on the version, lock the crankshaft toothed belt sprocket to TDC for cylinder 1 using either crankshaft arrester - T10050- or crankshaft arrester - T10100- .

Distinguishing the crankshaft toothed belt sprocket:

A = original version of toothed belt sprocket with circular tooth flanks, rectangular TDC marking on tooth in 12 o'clock position for cylinder 1 - use crankshaft arrester - T10050 -

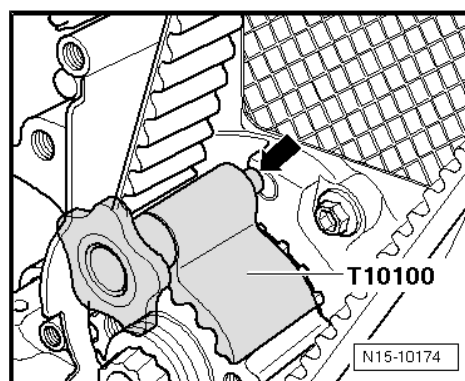
B = new version of toothed belt sprocket with elliptical tooth flanks, triangular TDC marking on the gap in the sprocket in 1 o'clock position - use crankshaft arrester - T10100-

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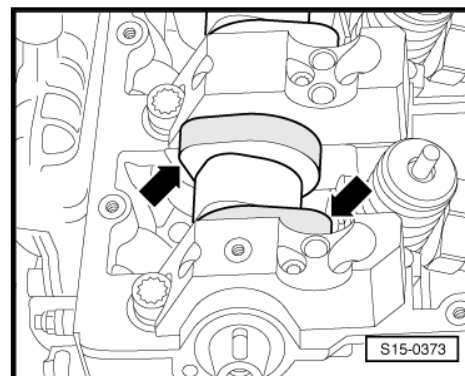


Note

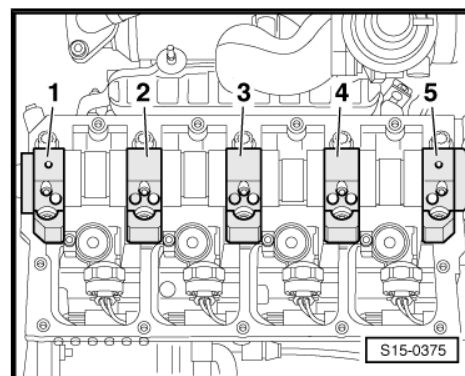
- ◆ Markings on the toothed belt sprocket and on the crankshaft arrester must be in line with each other -arrow-.
- ◆ The pin on the crankshaft arrester -arrow- must engage into the hole in the sealing flange.
- ◆ The crankshaft arrester can only be fitted onto the toothed belt sprocket from the front side of the serration.
- ◆ Ensure that the used bearing shells of the camshaft are not mixed up (pay attention to marking).
- ◆ When installing the camshaft pay attention to a correct fit of the retaining lugs of the bearing shells in the bearing caps and cylinder head.



- Oil contact surfaces of camshaft.
- Insert camshaft into the TDC for cylinder 1:
- The cams for cylinder 1 on the camshaft must point upwards -arrows-.



- Then tighten bearing caps -2- and -4- alternately and cross-wise.

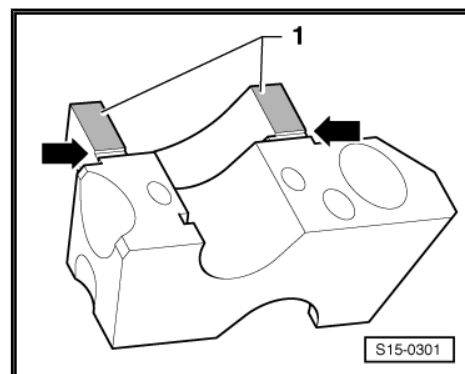


- On the outer bearing caps, apply a thin and even layer of sealant - D 454 300 A2- to the surfaces -1-.

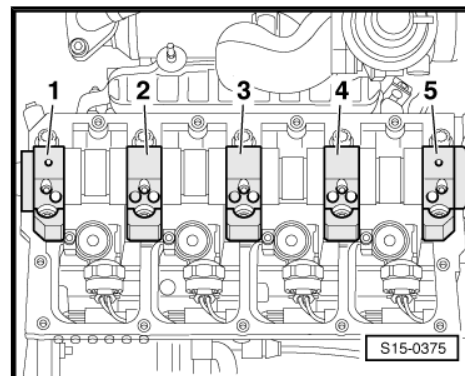


Note

Make sure that sealant does not get into the grooves -arrows- or onto the other surfaces.

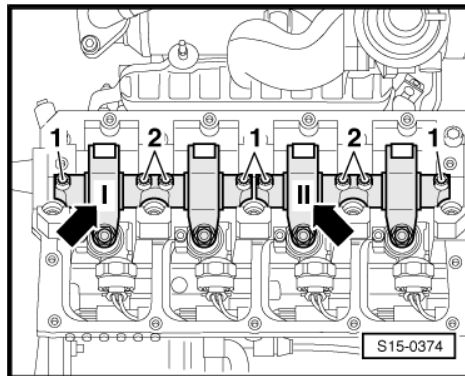


- Install and tighten bearing caps -1-, -3- and -5-.
- Bearing cap -5- must fit flush with the outer edge of the cylinder head as this may otherwise cause leaks on the tandem pump.





- Insert valve-lever shafts. While doing so, pay attention to the markings -arrows- made when removing.
- First tighten the inner -2- and then the outer screws -1- in several stages.
- Install gasket ring for camshaft, hub and camshaft sprocket ➔ [page 114](#) .
- Lock hub of camshaft with locking pin - 3359 - .
- install (set the timing) ➔ [page 38](#) .
- Install tandem pump ➔ [page 171](#) .
- If the valve-lever shafts or ball studs have been replaced, the unit injectors will need to be adjusted.
- Install cylinder head cover ➔ [page 83](#) .



Note

- ◆ *After installing the camshaft, the engine must not be cranked or started for about 30 minutes. The hydraulic bucket tappets must settle (otherwise valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*

2.13 Checking the hydraulic bucket tappets for engines with code BMM

Special tools and workshop equipment required

- ◆ Feeler gauges
- ◆ Wooden or plastic wedge



Note

- ◆ *Hydraulic bucket tappets cannot be repaired.*
 - ◆ *Irregular valve noises when starting engine are normal.*
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Test sequence

- Start engine and allow to run until the radiator fan starts. Increase revolutions to about 2500 rpm for 2 minutes and undertake a test drive if necessary.



Note

If there are irregular valve noises which disappear after a long drive but keep reappearing on short journeys then the return-flow check tube is defective. Fitting location: in the oil filter holder. The return-flow check tube cannot be replaced individually.

If the hydraulic bucket tappets are still loud, determine the faulty hydraulic bucket tappets as follows:

- Remove cylinder head cover ➔ [page 83](#) .
- Turn the crankshaft so that the cams of the supporting element being tested are pointing upwards.

- ◆ For vehicles with manual transmission, push the vehicle forward with the 4th gear engaged and the ignition switched off.
- ◆ For vehicles with automatic transmission, turn the crankshaft at the central screw.
- Determine the play between the cams and the bucket tappet:
- Press down the bucket tappet using a wooden or plastic wedge.

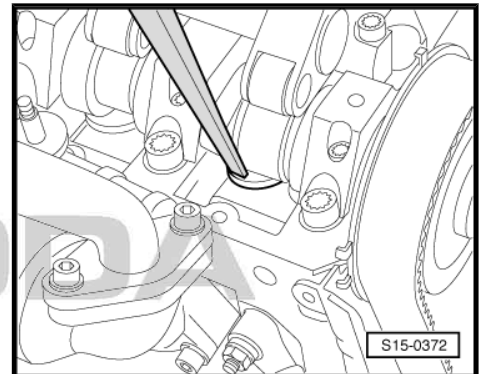
If a 0.20 mm feeler gauge can be slipped between the camshaft and the bucket tappet:

- Replace hydraulic bucket tappets ⇒ [page 115](#) .



Note

- ◆ *After installing the camshaft, the engine must not be cranked or started for about 30 minutes. The hydraulic bucket tappets must settle (otherwise valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*



2.14 Replacing valve stem seals for engines with code BMM

Cylinder head fitted

Special tools and workshop equipment required

- ◆ Valve assembly device - MP 1-213 (2036) -
- ◆ Extractor - MP 1-206 (3047 A)-
- ◆ Insertion tool - MP 1-306 (10-204)-
- ◆ Valve lever - MP 1-211 (VW 541/1A)-

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Note

- ◆ *With cylinder head removed:*
- ◆ *Remove glow plugs from the cylinder head ⇒ [page 250](#) .*
- ◆ *Remove unit injectors from the cylinder head ⇒ [page 221](#) .*
- ◆ *Position cylinder head on a suitable flat valve supporting plate.*

Removing

- Remove the camshafts ⇒ [page 115](#) .



Note

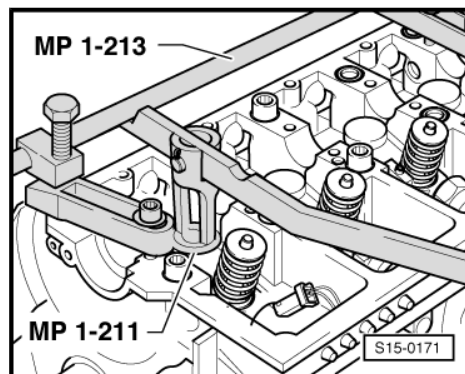
- ◆ *Ensure that the used bearing shells of the camshaft are not mixed up (pay attention to marking).*
- ◆ *When installing the camshaft, ensure it is correctly located in the retaining lugs of the bearing shells in the bearing caps and in the cylinder head.*
- ◆ *Ensure that the bucket tappets are not mixed up, for this step mark the assignment with waterproof marker on the reverse side.*

- Remove bearing shells of camshaft from the cylinder head.
- Remove bucket tappets and lay aside with the contact surface facing down. Make sure that you do not mix up the tappets.
- Position piston of the relevant cylinder to top dead centre (TDC).
- Insert the assembly device for valves - MP 1-213 - and adjust bearing to the stay bolt height.
- Remove valve springs with valve lever - MP 1-211- .



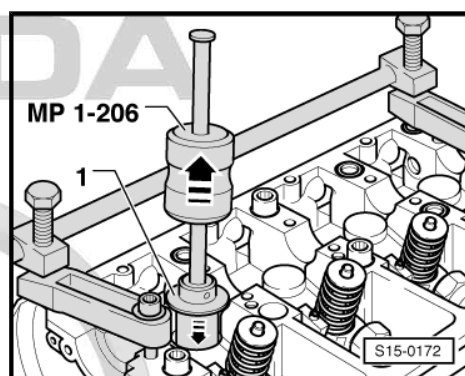
Note

The valves rest on the piston crown.

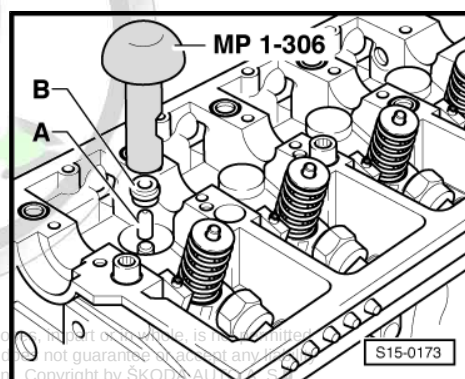


- Use the extractor - MP 1-206- to remove the valve stem seal.

Installing



- Insert the supplied plastic bushings -A- on the relevant valve stem. This will prevent any damage to the new valve stem seals -B- .
- Insert the new valve stem seal into the insertion tool - MP 1-306- .
- Oil the sealing lip of the valve stem seal and carefully slide into the valve guide.
- Remove plastic sleeve.
- Reinstall valve springs and secure with collets.
- Insert bucket tappets.
- Install camshafts ➔ [page 115](#) .



Note

- ◆ *After installing the camshaft, the engine must not be started for about 30 minutes. The hydraulic bucket tappets must settle (otherwise valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*

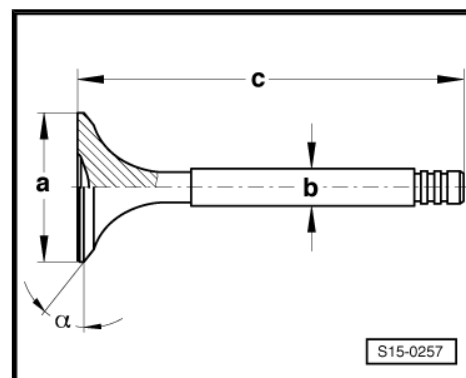
2.15 Valve dimensions for engines with code BMM

Dimension		Inlet valve	Exhaust valve
$\varnothing a$	mm	35.95	31.45
$\varnothing b$	mm	6.980	6.965
c	mm	89.45	89.05
α	°	45	45



Note

Valves must not be reworked by grinding. Only grinding in with grinding paste is permissible.



2.16 inspecting valve guides

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Dial gauge

Test sequence



Note

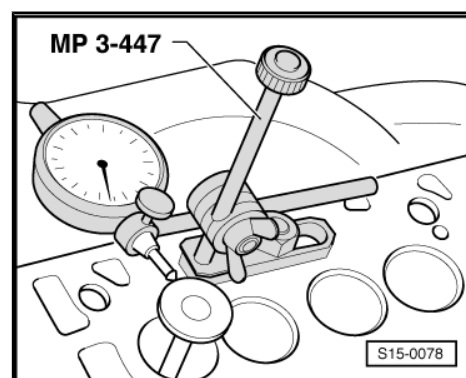
If the valves are replaced when carrying out repair work, use new valves for the measurement.

- Insert valve into valve guide. End of valve stem must be flush with guide.
- Valve rock: max. 1.3 mm



Note

If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceeded, replace cylinder head. The valve guides cannot be changed.





17 – Lubrication

1 Removing and installing parts of the lubrication system



Note

- ♦ If the engine is damaged and there is a suspicion that this damage was caused due to a mixture of oil with fuel (engine odour test), then it is essential to check whether the tandem pump is sealed on the inside ➔ [page 178](#) ,
- ♦ If considerable quantities of metal swarf as well as abrasion is found in the engine oil when carrying out engine repairs, carefully clean the oil galleries in order to avoid consequential damage and additionally replace the engine oil cooler as well as the oil filter element.
- ♦ The oil level must not be above the Max. marking on the oil dipstick - risk of damage to catalytic converter!

Check the engine oil, amount of oil and oil specification ➔ Maintenance ; Booklet Octavia II .

1 - 15 Nm

2 - 15 Nm

3 - Bracket at top

- ☐ Wiring for Oil level and oil temperature sender - G266-
- ☐ pay attention to different version

4 - Drive chain sprocket

- ☐ for oil pump
- ☐ Removing and installing ➔ [page 62](#)

5 - Dipstick

- ☐ Oil level must not exceed the max. marking

6 - Hopper

- ☐ Remove for extracting oil

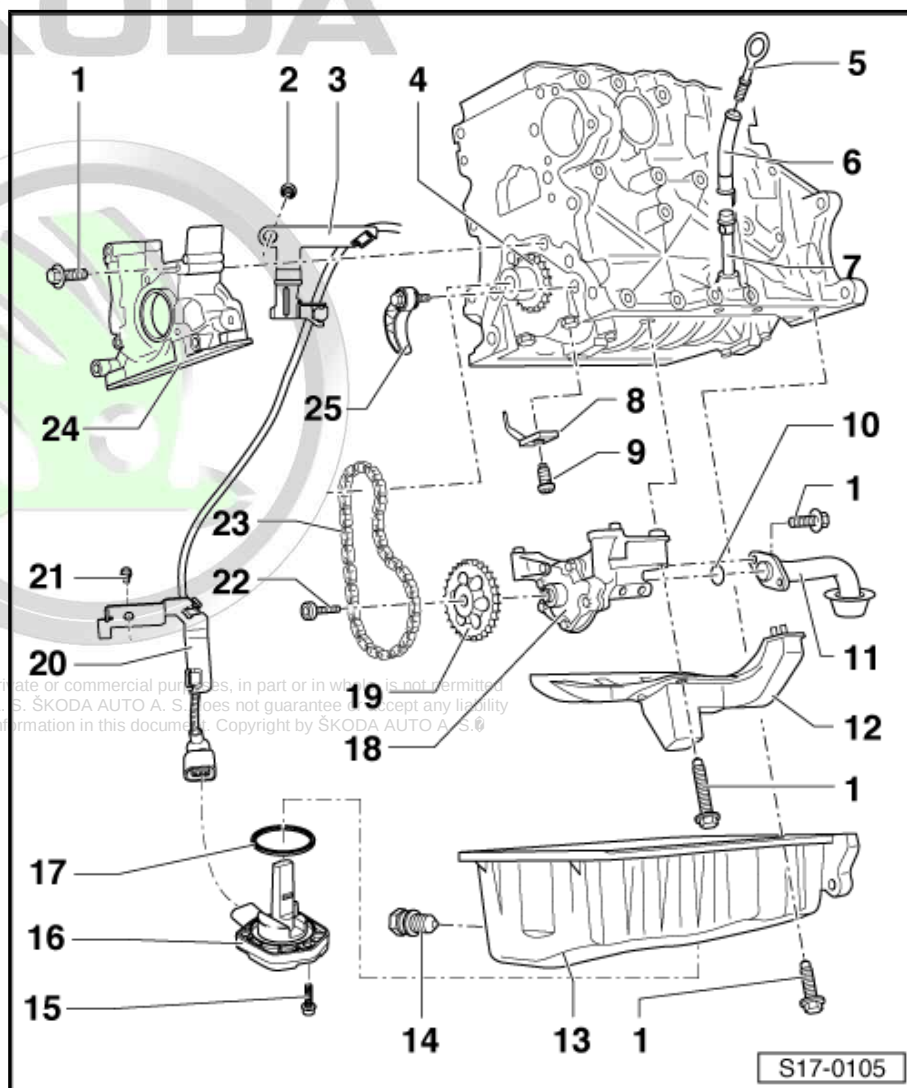
7 - Guide tube

8 - Oil spray jet

- ☐ for cooling pistons
- ☐ Pay attention to part number (right-angle bend)

9 - Pressure relief valve, 27 Nm

- ☐ opens at an overpressure of 0.25 to 0.32 MPa (2.5 to 3.2 bar)
- ☐ replace without sealant



S17-0105

10 - O-ring

- ☐ replace

11 - Intake manifold

- ☐ Clean strainer if dirty

12 - Baffle

13 - Oil pan

- ☐ Removing and installing ⇒ [page 125](#)
- ☐ install with silicone sealant - D 176 404 A2-

14 - Drain plug, 30 Nm

- ☐ with sealing ring
- ☐ replace

15 - 10 Nm

- ☐ replace

16 - Oil level and oil temperature sender - G266 -

- ☐ Check ⇒ Vehicle diagnostic tester

17 - O-ring

- ☐ replace

18 - Oil pump

- ☐ with pressure relief valve 1,2 MPa (12 bar)
- ☐ Removing and installing ⇒ [page 127](#)
- ☐ before installing, check whether both dowel sleeves are present
- ☐ if there is any scoring on the contact surfaces of the gears, replace
- ☐ Tightening torque of oil pump cover at oil pump housing: 10 Nm

19 - Oil pump sprocket

- ☐ Fits onto oil pump shaft in one position only

20 - Bracket at bottom

- ☐ for the cable to the oil level and oil temperature sender

21 - 15 Nm

22 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace

23 - Oil pump chain

- ☐ before removing mark running direction
- ☐ check for wear

24 - Sealing flange on the belt pulley side

- ☐ install with silicone sealant - D 176 404 A2-
- ☐ replace the gasket ring for the crankshaft - on the belt pulley side ⇒ [page 49](#)

25 - Chain tensioner

- ☐ do not disassemble
- ☐ Replace chain tensioner if spring is broken
- ☐ Check fitting position
- ☐ When installing, hook on the spring and pretension
- ☐ tighten to 16 Nm

1.1 Disassembling and assembling the oil filter holder

1 - Screw plug - 25 Nm

2 - Gasket

- ☐ replace

3 - Engine oil cooler

- ☐ Pay attention to the information regarding a necessary replacement.
- ☐ Connection diagram for coolant hoses
⇒ [page 129](#)

4 - Gasket

- ☐ replace
- ☐ Fitting position
⇒ [page 125](#)

5 - 15 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ tighten crosswise

6 - Oil filter holder

- ☐ with return-flow check tube
- ☐ Oil return-flow check tube cannot be replaced individually

7 - Sealing ring

- ☐ replace

8 - Oil pressure switch - F1- - 20 Nm

- ☐ 0.07 MPa (0.7 bar) switch
- ☐ Check ⇒ [page 127](#)

9 - Screw cap - 25 Nm

- ☐ Loosen and tighten using an oil filter tool e.g. -3417- .

10 - O-ring

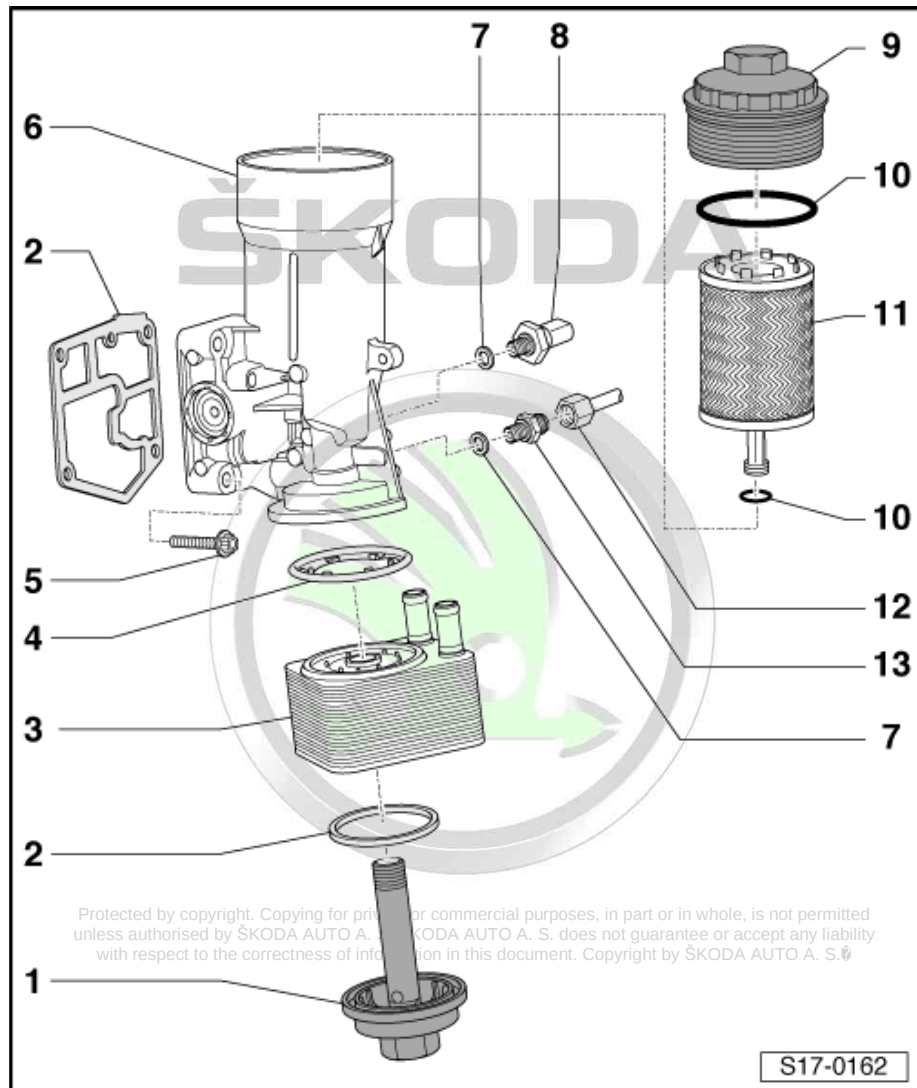
- ☐ replace

11 - Oil filter element

- ☐ pull off from screw cap (Pos. 9)
- ☐ Replace O-rings Pos. 10 when replacing the oil filter element
- ☐ Check fitting position
- ☐ Keep to change intervals ⇒ Maintenance ; Booklet Octavia II

12 - Oil feed line

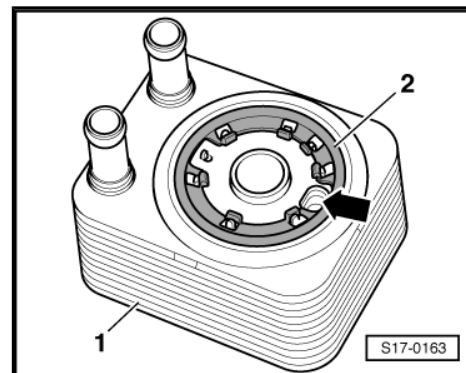
- ☐ to exhaust gas turbocharger
- ☐ Observe the mounting sequence:
 - Screw on the union nuts first of all by hand.
 - Then tighten the union nuts to 22 Nm.
 - Then secure the oil feed line in the brackets



13 - Connecting piece - 35 Nm

Fitting position of gasket for engine oil cooler

- Place the gasket -2- in such a way that it can be pressed onto all the lugs of the engine oil cooler -1-.
- The oil duct -arrow- must not be covered from the gasket.



1.2 Removing and installing oil pan

Special tools and workshop equipment required

- ◆ Socket - T10058-
- ◆ Silicone sealant - D 176 404 A2-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. - D 000 401 04-
- ◆ Protective goggles and gloves

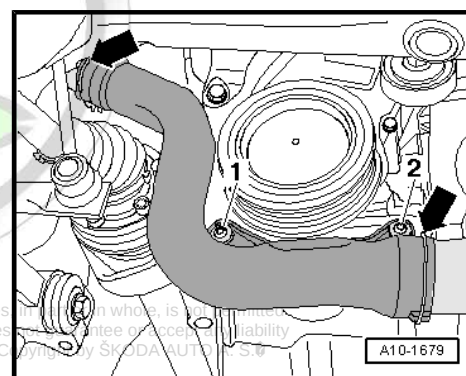
Removing

- Remove the right wheelhouse liner ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .

Vehicles with engine code BKD, AZV

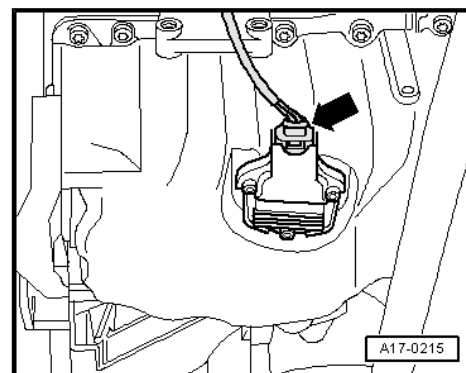
- Unscrew screws -1- and -2- and remove charge air pipe -arrows-.

Continued for all vehicles



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- Disconnect connector -arrow- from oil level and oil temperature sender - G266- .
- Drain engine oil ⇒ Maintenance ; Booklet Octavia II .





- Unscrew the bolts of oil pan/gearbox -arrows-.
- Loosen bolts -1...20- crosswise and release.
- Remove oil pan, if necessary release by applying slight blows with a rubber-headed hammer.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:



WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

- Remove residual sealant from the sealing surfaces on the cylinder block and on the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.
- Cut off nozzle tube at the front marking ($\varnothing$ of nozzle approx. 3 mm).
- Apply silicone sealant bead -arrow- to the clean sealing surface of the oil pan, as shown.
- Thickness of sealant bead: 2-3 mm



Note

- ♦ *The sealant bead must not be thicker than 3 mm otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.*
- ♦ *Take particular care when applying the sealant bead in the area of the rear sealing flange -arrows-.*
- ♦ *The oil pan must be installed within 5 minutes after applying the silicone sealant.*

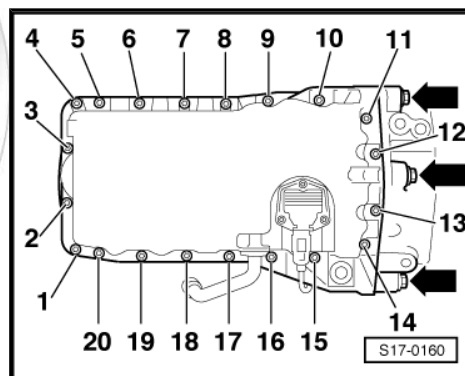
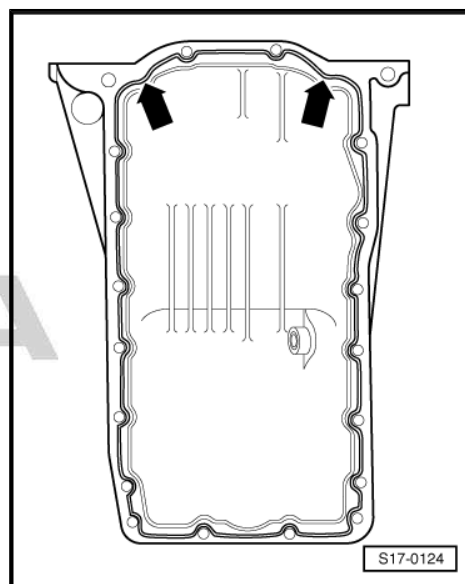
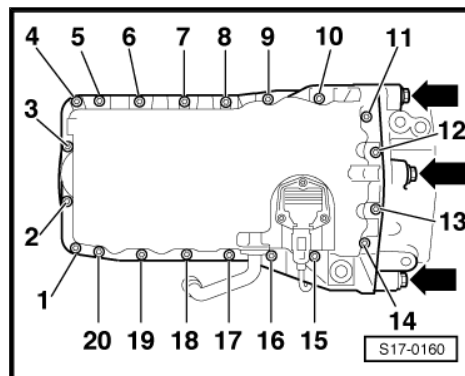
- Fit on oil pan immediately and tighten the bolts as follows:
- First of all pre-tighten screws -1...20- crosswise to 5 Nm.
- Tighten the bolts of the oil pan/gearbox -arrows- to a torque of 40 Nm.
- Tighten screws -1...20- crosswise to 15 Nm.



Note

- ♦ *When installing the oil pan with the engine removed, ensure that the oil pan is flush with the cylinder block at the flywheel side.*
- ♦ *Let sealant dry for approx. 30 minutes after installing oil sump. Only then fill with engine oil.*

- Fill with engine oil and check the oil level ⇒ Maintenance ; Booklet Octavia II .



1.3 Removing and installing oil pump

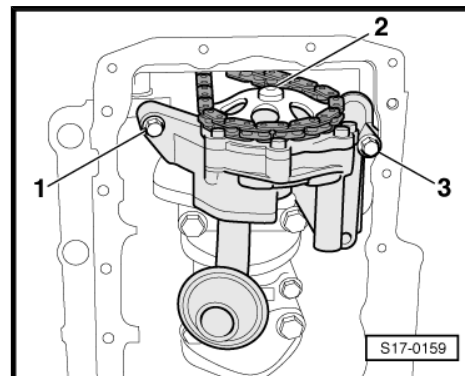
Removing

- Removing the oil pan ➔ [page 125](#) .
- Remove baffle (➔ [page 122](#) ; Pos. 12).
- Release screw -2-.
- Pull the chain sprocket off the oil pump shaft.
- Release screws -1- and -3- and remove oil pump.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Insert top dowel sleeves into the oil pump.
- ♦ Oil pump shaft/chain sprocket installation position: the sprocket can only be installed on the shaft in one position
- ♦ Replace the screw in the oil pump chain sprocket.
- Installing the oil pan ➔ [page 125](#) .



1.4 Testing oil pressure and oil pressure switch

Special tools and workshop equipment required

- ♦ Oil pressure tester , e.g. -V.A.G 1342-
- ♦ Voltage tester , e. g. -V.A.G 1527 B -
- ♦ Auxiliary measuring set, , e. g. -V.A.G 1594 C -

Test conditions

- Oil level o.k.
- Engine oil temperature approx. 80 C.

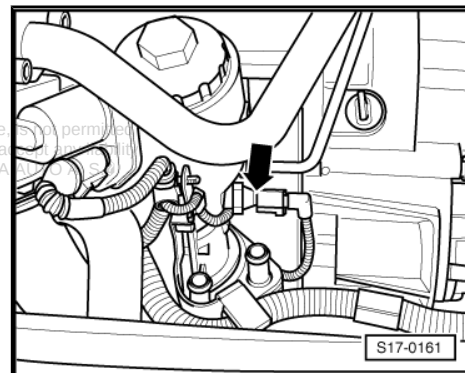


Note

Functional test and repair of the visual and acoustic oil pressure display ➔ Current flow diagrams, Electrical fault finding and Fitting locations, ➔ Vehicle diagnostic tester.

Test preparations

- Remove engine cover ➔ [page 13](#) .
- Remove the air guide hose between the lock carrier and air filter.
- Remove the plug -arrow- on the oil pressure switch - F1- and unscrew the oil pressure switch - F1- .



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- Screw the connection of the oil pressure tester - V.A.G 1342- into the hole for the oil pressure switch.
- Screw the oil pressure switch -2- into the oil pressure tester.

Testing oil pressure switch

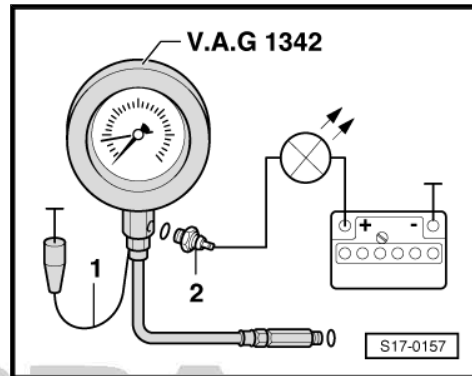
- Connect brown cable -1- of oil pressure tester to earth (-).
- Unclamp the voltage tester with its auxiliary cables out of the measuring tool set on the oil pressure switch and plus (+) terminal on the battery.
- The LED must not light up.

If the LED lights up:

- Replace oil pressure switch.

Diode does not light up:

- Start the engine.



Note

Observe the testing equipment and the LED while actuating the starter since the switching point of the oil pressure switch can already be exceeded when starting up.

- The LED must come on at an overpressure of 0.055 ... 0.085 MPa (0.55 ... 0.85 bar).

If the LED does not light up:

- Replace oil pressure switch.

Testing oil pressure

- Start the engine.
- Oil pressure when engine idling: at least 0.08 MPa (0.8 bar).
- Oil pressure at 2000 rpm: min. 0.2 MPa (2.0 bar)

If the specified values are not reached: Oil pump defective.

- Replace oil pump ⇒ [page 127](#) .
- Oil pressure at a higher engine speed: max. 0.7 MPa (7.0 bar).

If the specified value is exceeded: Pressure relief valve defective.

- Replace oil filter holder ⇒ [page 124](#) .

19 – Cooling

1 Removing and installing parts of the cooling system



WARNING

When opening the coolant expansion reservoir, hot steam or hot coolant may escape. Cover the cap with a cloth and open carefully.



Note

- ◆ *When the engine is warm the cooling system is under pressure. If necessary, release pressure before beginning repair work.*
- ◆ *Secure all hose connections with corresponding hose clips.*
- ◆ *Spring-type clip pliers are recommended for installation of spring-type clips.*
- ◆ *Replace seals and sealing rings.*
- ◆ *The arrows affixed to the coolant pipes and the coolant hoses must stand opposite to each other.*

1.1 Parts of the cooling system fitted to body for engines with code BKD, AZV

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1 - Radiator

- ☐ Removing and installing
⇒ [page 138](#)
- ☐ After replacing, fill with
fresh coolant
⇒ [page 135](#)

2 - O-ring

- ☐ Replace if damaged.

3 - Top coolant hose

- ☐ To connection fitting at
cylinder head
- ☐ Connection diagram for
coolant hoses
⇒ [page 133](#)

4 - Screw cap

- ☐ Test pressure
0.14...0.16 MPa
(1.4...1.6 bar)
- ☐ Check ⇒ [page 149](#)

5 - Connector

6 - 3 Nm

7 - Coolant expansion tank

8 - Bottom coolant hose

- ☐ to connection fitting for
coolant regulator at cyl-
inder block
- ☐ Connection diagram for
coolant hoses
⇒ [page 133](#)

9 - 5 Nm

10 - 5 Nm

11 - Right radiator fan - V35-

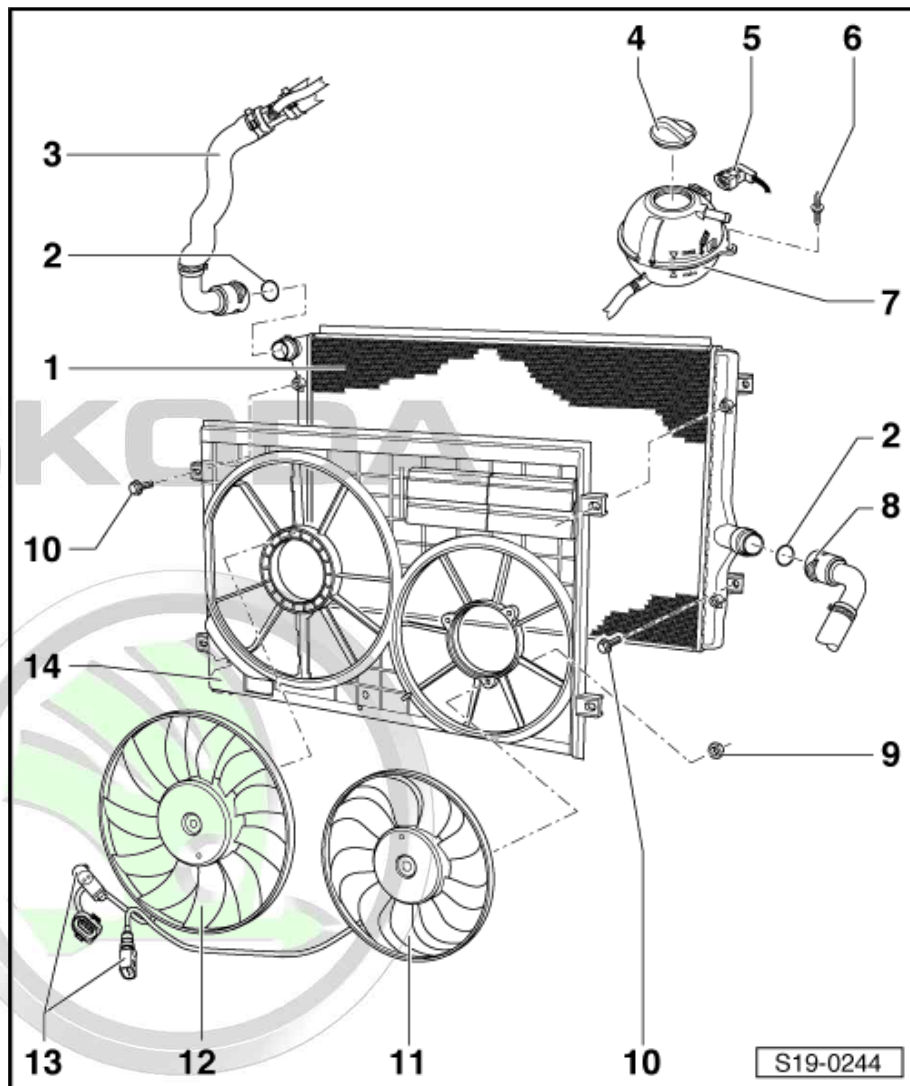
- ☐ Removing and installing ⇒ [page 137](#)

12 - Radiator fan - V7-

- ☐ with radiator fan control unit - J293-
- ☐ Removing and installing ⇒ [page 137](#)

13 - Connector

14 - Fan shroud



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1.2 Parts of the cooling system engine side for engines with code BKD, AZV

1 - Radiator for exhaust gas recirculation

- ☐ Removing and installing
⇒ [page 241](#)

2 - to heat exchanger

- ☐ Coolant feed line
- ☐ Connection diagram for coolant hoses
⇒ [page 133](#)

3 - Hose

- ☐ to flap of radiator for exhaust gas recirculation

4 - 10 Nm

5 - The coolant pipe at the rear

6 - Retaining clip

- ☐ Check for secure seating

7 - O-ring

- ☐ replace

8 - Coolant temperature sender - G62-

- ☐ with coolant temperature sender - G2-

9 - Hose

- ☐ to radiator for exhaust gas recirculation
- ☐ Connection diagram for coolant hoses
⇒ [page 133](#)

10 - Connection fitting

- ☐ at cylinder head
- ☐ with coolant temperature sender - G62-

11 - from heat exchanger

- ☐ Coolant return-flow line
- ☐ Connection diagram for coolant hoses ⇒ [page 133](#)

12 - 40 Nm

13 - Hose

- ☐ to cylinder head

14 - Hose

- ☐ to the tube at the rear

15 - Small distributor

16 - Hose

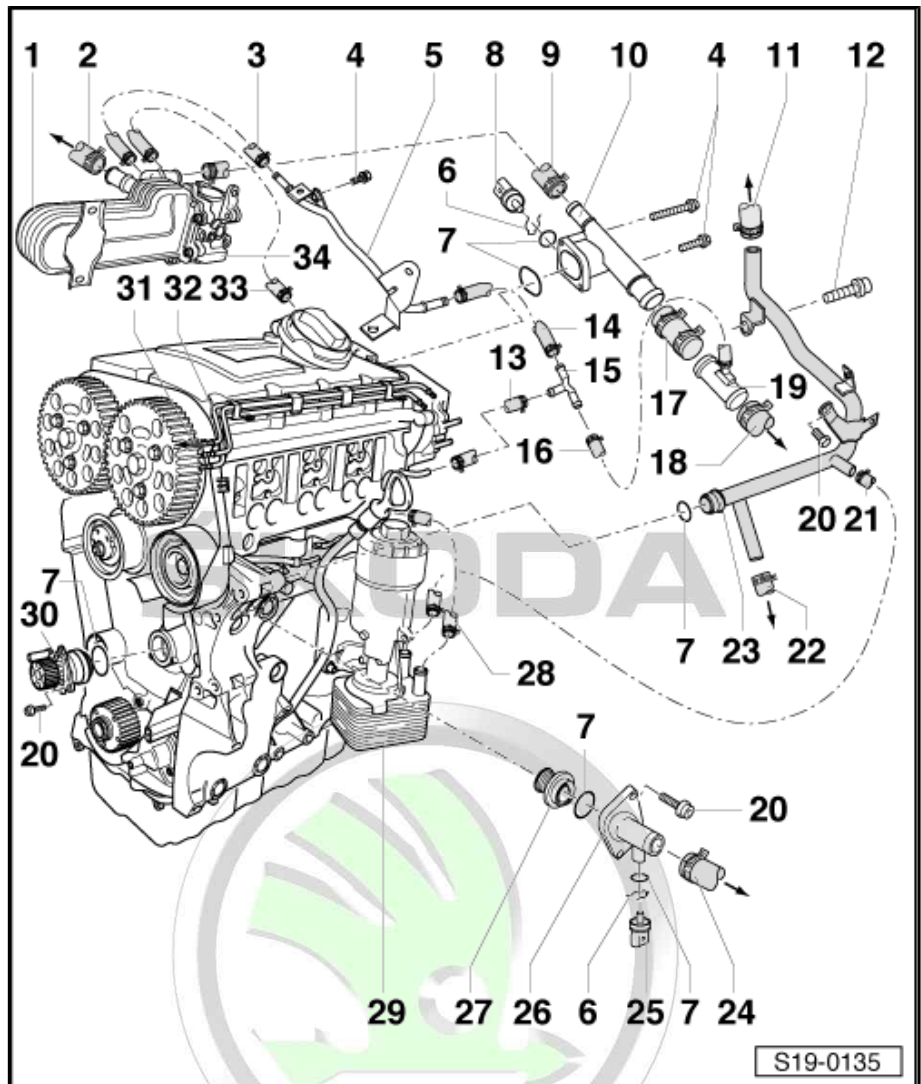
- ☐ to the distributors

17 - Hose

- ☐ To connection fitting at cylinder head

18 - Hose

- ☐ towards top radiator



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19 - Distributor part

20 - 15 Nm

21 - Hose

- ☐ from the engine oil cooler

22 - to the coolant expansion reservoir

- ☐ Connection diagram for coolant hoses ➔ [page 133](#)

23 - Coolant pipe

24 - Hose

- ☐ to bottom radiator

25 - Coolant temperature sender at radiator outlet - G83-

26 - Connection fitting

- ☐ with coolant regulator
- ☐ with coolant temperature sender at radiator outlet - G83-

27 - Coolant regulator

- ☐ Removing and installing ➔ [page 147](#)
- ☐ check: heat up regulator in a water bath

Start of opening approx. 87 °C

completely open approx. 102°C

Stroke: at least 7 mm

28 - Hose

- ☐ to engine oil cooler connection from cylinder block

29 - Engine oil cooler

- ☐ Removing and installing ➔ [page 122](#)

30 - Coolant pump

- ☐ check smooth operation
- ☐ Check fitting position
- ☐ Removing and installing ➔ [page 147](#)

31 - to the coolant expansion tank at the top

- ☐ Connection diagram for coolant hoses ➔ [page 133](#)

32 - Top coolant pipe

- ☐ bolted to intake manifold

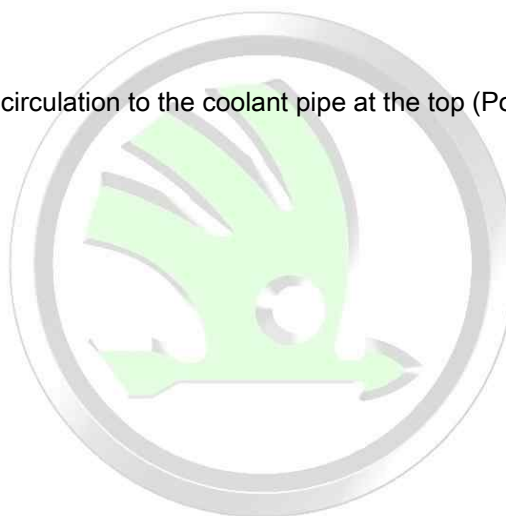
33 - Hose

- ☐ from the flap of radiator for exhaust gas recirculation to the coolant pipe at the top (Pos. 32)

34 - Radiator flap for exhaust gas recirculation

- ☐ Removing and installing ➔ [page 241](#)

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1.3 Connection diagram for coolant hoses for engines with code BKD, AZV

Vehicles without auxiliary heating.

1 - Radiator

- ☐ Removing and installing
⇒ [page 138](#)
- ☐ After replacing, fill with
fresh coolant
⇒ [page 135](#)

2 - Engine oil cooler

- ☐ After replacing, fill with
fresh coolant
⇒ [page 135](#)
- ☐ Removing and installing
⇒ [page 122](#)

3 - Coolant regulator

- ☐ Removing and installing
⇒ [page 147](#)

4 - Coolant pump

- ☐ Removing and installing
⇒ [page 147](#)

5 - Cylinder head and cylinder block

- ☐ After replacing, fill with
fresh coolant
⇒ [page 135](#)

6 - Coolant expansion tank

- ☐ with cap
- ☐ Check the overpressure
valve in the screw cap
⇒ [page 149](#)

7 - Radiator for exhaust gas re-circulation

- ☐ After replacing, fill with
fresh coolant
⇒ [page 135](#)
- ☐ Removing and installing ⇒ [page 241](#)

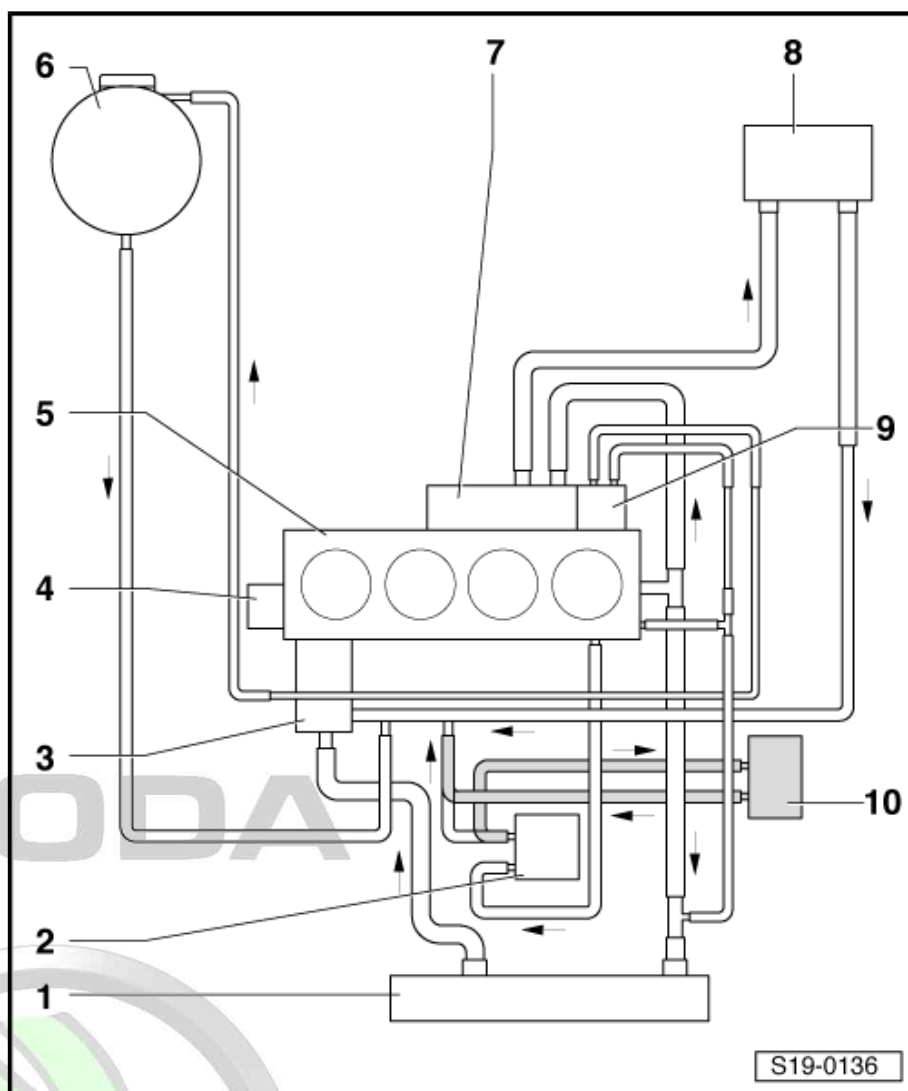
8 - Heat exchanger for heating

- ☐ After replacing, fill with fresh coolant ⇒ [page 135](#)

9 - Radiator flap for exhaust gas recirculation

10 - ATF radiator

- ☐ for models with an automatic gearbox
- ☐ After replacing, fill with fresh coolant ⇒ [page 135](#)



Vehicles with auxiliary heating

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1 - Coolant expansion tank

- ☐ with cap
- ☐ Check the overpressure valve in the screw cap
⇒ [page 149](#)

2 - Cylinder block

- ☐ After replacing, fill with fresh coolant
⇒ [page 135](#)

3 - Radiator flap for exhaust gas recirculation

4 - Radiator for exhaust gas recirculation

- ☐ After replacing, fill with fresh coolant
⇒ [page 135](#)
- ☐ Removing and installing
⇒ [page 241](#)

5 - Cylinder head

- ☐ After replacing, fill with fresh coolant
⇒ [page 135](#)

6 - Non-return valve

- ☐ The arrow on the non-return valve must point to the exhaust gas recirculation radiator

7 - Non-return valve

- ☐ integrated in the coolant hose
- ☐ not visible from the outside

8 - Heat exchanger for heating

- ☐ After replacing, fill with fresh coolant ⇒ [page 135](#)

9 - During operation of the auxiliary heater - N279-

10 - ATF radiator

- ☐ for models with an automatic gearbox
- ☐ After replacing, fill with fresh coolant ⇒ [page 135](#)

11 - Top coolant hose

12 - Engine oil cooler

- ☐ After replacing, fill with fresh coolant ⇒ [page 135](#)
- ☐ Removing and installing ⇒ [page 122](#)

13 - Radiator

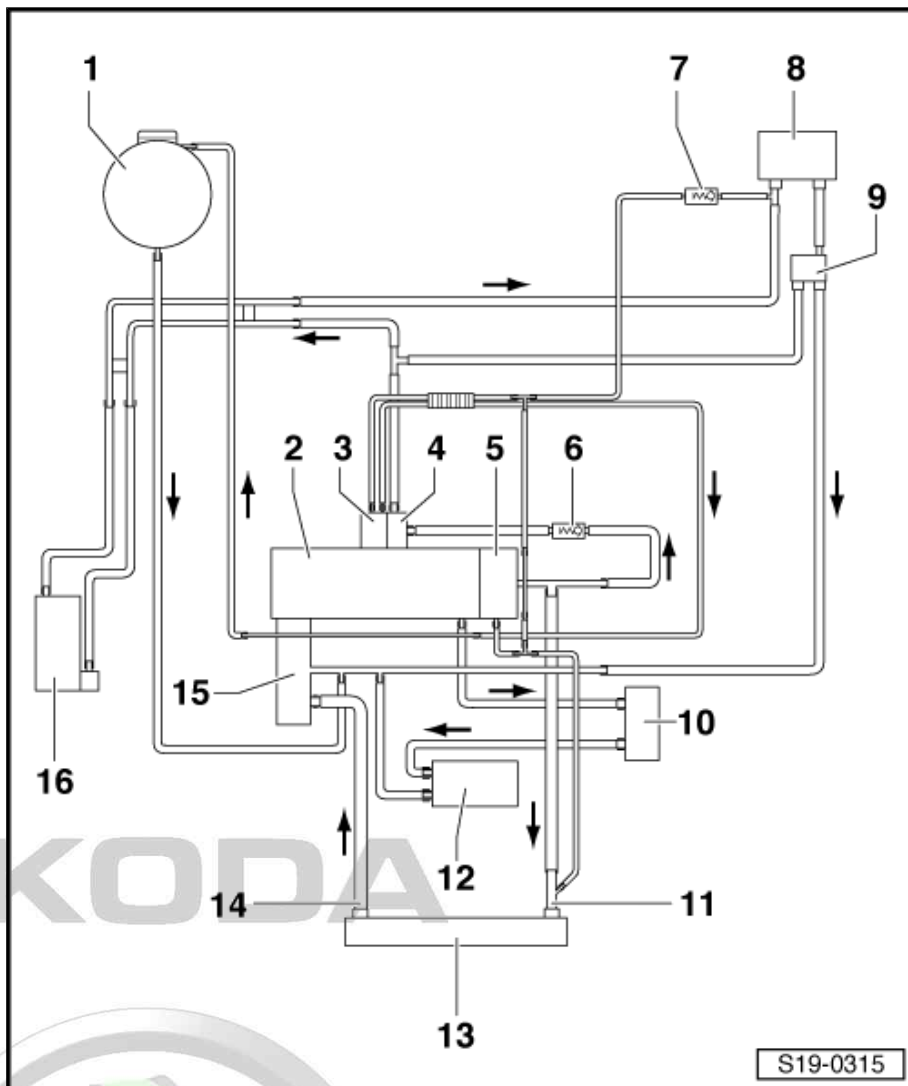
- ☐ Removing and installing ⇒ [page 138](#)
- ☐ After replacing, fill with fresh coolant ⇒ [page 135](#)

14 - Bottom coolant hose

15 - Coolant pump/coolant regulator

- ☐ Removing and installing ⇒ [page 147](#)

16 - Auxiliary heating



1.4 Draining and topping up coolant for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Pliers for spring-type clips
- ◆ Refractometer - T10007-

Draining



Note

Collect drained coolant in a clean container for proper disposal or reuse.



WARNING

When opening the coolant expansion reservoir, hot steam or hot coolant may escape. Cover the cap with a cloth and open carefully.

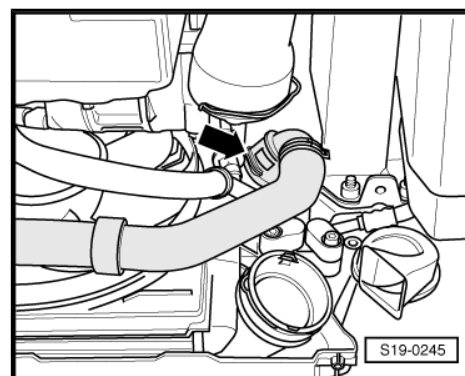
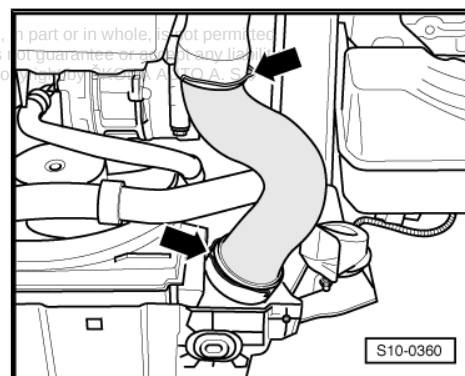
- Open the cap of the coolant expansion reservoir.
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Place a catch pan under the engine.
- Remove connecting hose on right; to do so, lift retaining clips -arrows-.



WARNING

Shut off the opening of the charge air cooler, e.g. with a clean foam piece, so that no coolant can penetrate.

- Remove the coolant hose from the radiator; to do so pull the retaining clip -arrow-.
- Remove engine cover ⇒ [page 13](#) .
- Remove the air guide hose between the lock carrier and air filter.





- Detach the rear coolant hose on the engine oil cooler -arrow- and drain residual coolant.

Vehicles with auxiliary heating

- Remove the coolant hoses on the pipes of the auxiliary heating and drain residual coolant.

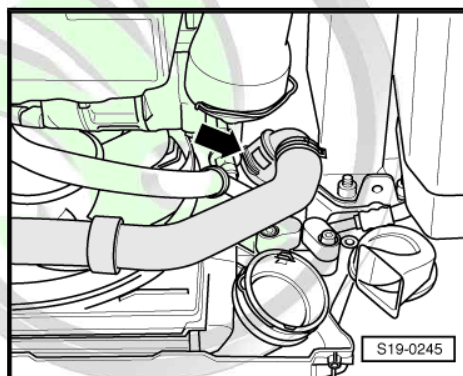
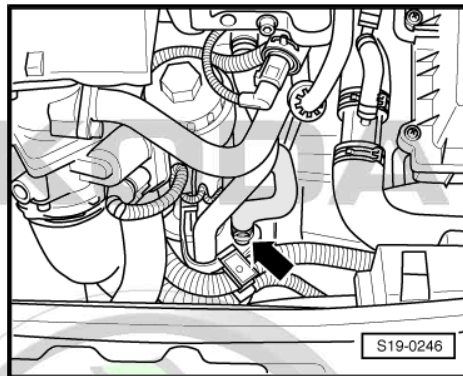
Filling up



Note

Replace O-rings.

- Connect coolant hose at bottom of radiator -arrow-.



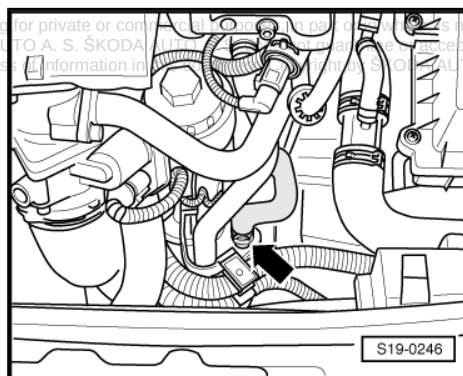
- Connect the coolant hose on the engine oil cooler at the rear -arrow-.

Vehicles with auxiliary heating

- Place the coolant hoses onto the pipes of the auxiliary heating and secure with spring strap clamps.

Select the appropriate coolant additive from the ⇒ Electronic Catalogue of Original Parts or from the list of allowed coolant additives ⇒ Maintenance ; Booklet Octavia II .

- In a clean reservoir mix water and coolant additive in the correct mixing ratio ⇒ Maintenance ; Booklet Octavia II .



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- Top up coolant through the neck of the expansion reservoir, until it reaches the max. marking.
- Switch off the heater unit and air conditioning unit.
- Start engine and run at a speed of approx. 1500 rpm for max. 2 minutes. When doing so, fill coolant into the expansion tank up to the max. marking.
- Tighten the cap of the coolant expansion reservoir.

Vehicles without auxiliary heating.

- Run engine until fan starts.

Vehicles with auxiliary heating



Caution

The auxiliary heating must only be switched on, if the refrigerant circuit is filled up -as described below-.

- Connect vehicle diagnosis, measurement and information system - VAS 5051- .
- Start the engine and maintain the engine speed for about 3 minutes at approx. 2000 r.p.m.
- On the display press consecutively the buttons for "Vehicle self-diagnosis", "18 - Auxiliary heating system" and "03 - Actuator diagnosis".
- Press the right arrow on the display so often until the coolant shut-off valve of heating system - N279- is shown.
- Perform self-diagnosis for the coolant shut-off valve of heating system - N279- and maintain the engine speed at approx. 2000 rpm for about 1 minute.
- Run engine until fan starts.

Continued for all vehicles

- Check coolant level when the expansion reservoir is closed.
- When engine is at operating temperature the coolant level must be at the maximum marking, when engine is cold between the minimum and the maximum markings.



WARNING

Hot steam may escape when the expansion reservoir is opened. Wear safety goggles and safety clothing to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.

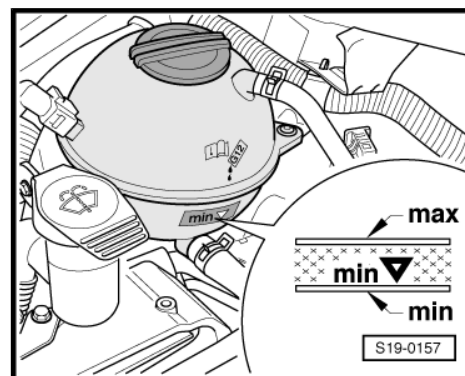
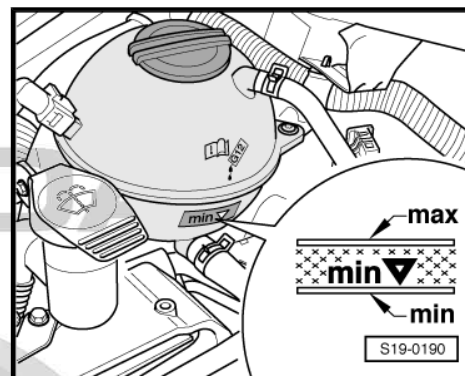
- If necessary, top up with coolant.

Further installation occurs in reverse order.

1.5 Fan shroud for radiator fan - V7- and radiator fan right - V35- for engines with code BKD, AZV Removing and installing

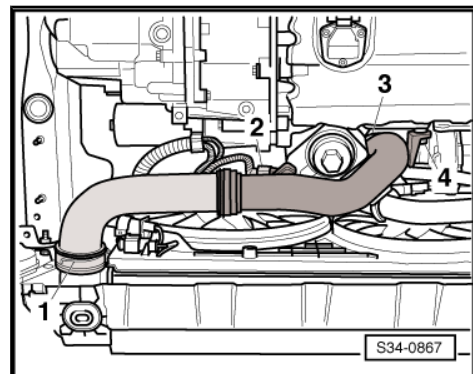
Removing

- Remove engine cover ➔ [page 13](#) .





- Remove the air filter with air guide hose from the lock carrier
⇒ [page 208](#) .
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Disconnect plug -2- from charge pressure sender - G31- / intake air temperature sender - G42- .
- Release screw -4-.
- Remove charge air pipe with connecting hose; to do so raise the retaining clips -1- and -3-.

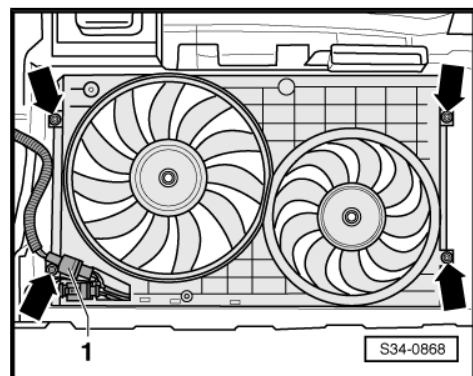


- Disconnect plug connection -1-.
- Remove screws -arrows- and take out fan shroud downwards.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ♦ Tightening torques: ⇒ [page 129](#)



1.6 Removing and installing radiators for engines with code BKD, AZV

Special tools and workshop equipment required

- ♦ Catch pan for workshop cranes , e.g. -VAS 6208-
- ♦ Pliers for spring-type clips

Removing

- Switch off ignition and pull out ignition key.



Note

Collect drained coolant in a clean container for proper disposal or reuse.



WARNING

When opening the coolant expansion reservoir, hot steam or hot coolant may escape. Cover the cap with a cloth and open carefully.

- Open the cap of the coolant expansion reservoir.
- Remove fan shroud for radiator fan - V7- and right radiator fan - V35 - ⇒ [page 137](#) .
- Remove connecting hose from the right charge air pipe; To do this, raise retaining clips.

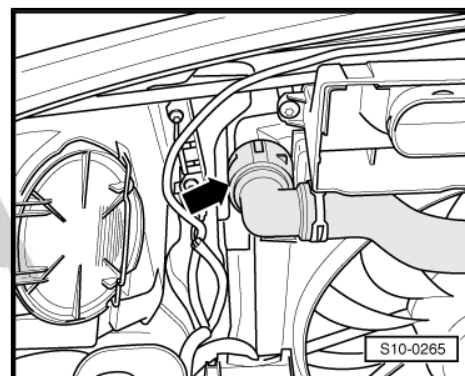
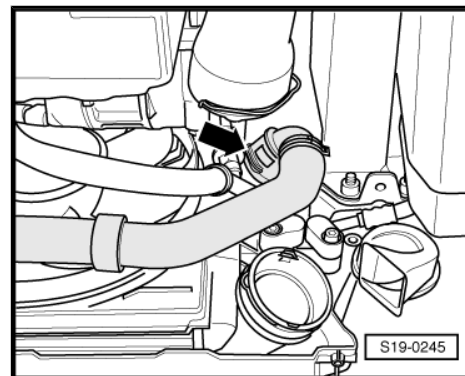
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WARNING

Shut off the opening of the charge air cooler, e.g. with a clean foam piece, so that no coolant can penetrate.

- Place a catch pan under the engine.
- Remove the bottom coolant hose from the radiator; to do so, pull retaining clips -arrow-.
- Detach top coolant hose from the radiator -arrow-.

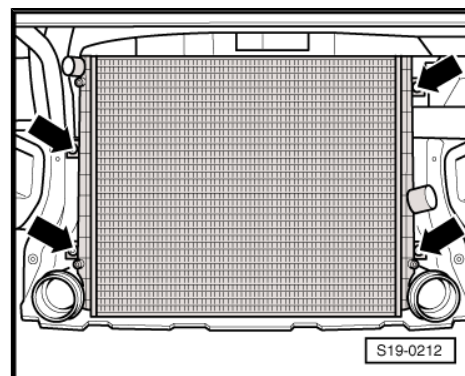


- Screw out screws -arrows- and remove the radiator upwards.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ◆ Tightening torques: ⇒ [page 129](#)
- If a new radiator has been fitted, the old (drained) coolant must not be used for topping up.
- Top up coolant ⇒ [page 135](#).



1.7 Parts of the cooling system fitted to body for engines with code BMM

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1 - Radiator fan - V7-

- ☐ with radiator fan control unit - J293-
- ☐ Removing and installing ➔ [page 145](#)

2 - 5 Nm

3 - Fan shroud

4 - Top coolant hose

- ☐ To connection fitting at cylinder head
- ☐ Connection diagram for coolant hoses ➔ [page 143](#)

5 - O-ring

- ☐ Replace if damaged.

6 - Radiator

- ☐ Removing and installing ➔ [page 146](#)
- ☐ After replacing, fill with fresh coolant ➔ [page 143](#)

7 - 5 Nm

8 - O-ring

- ☐ Replace if damaged.

9 - Bottom coolant hose

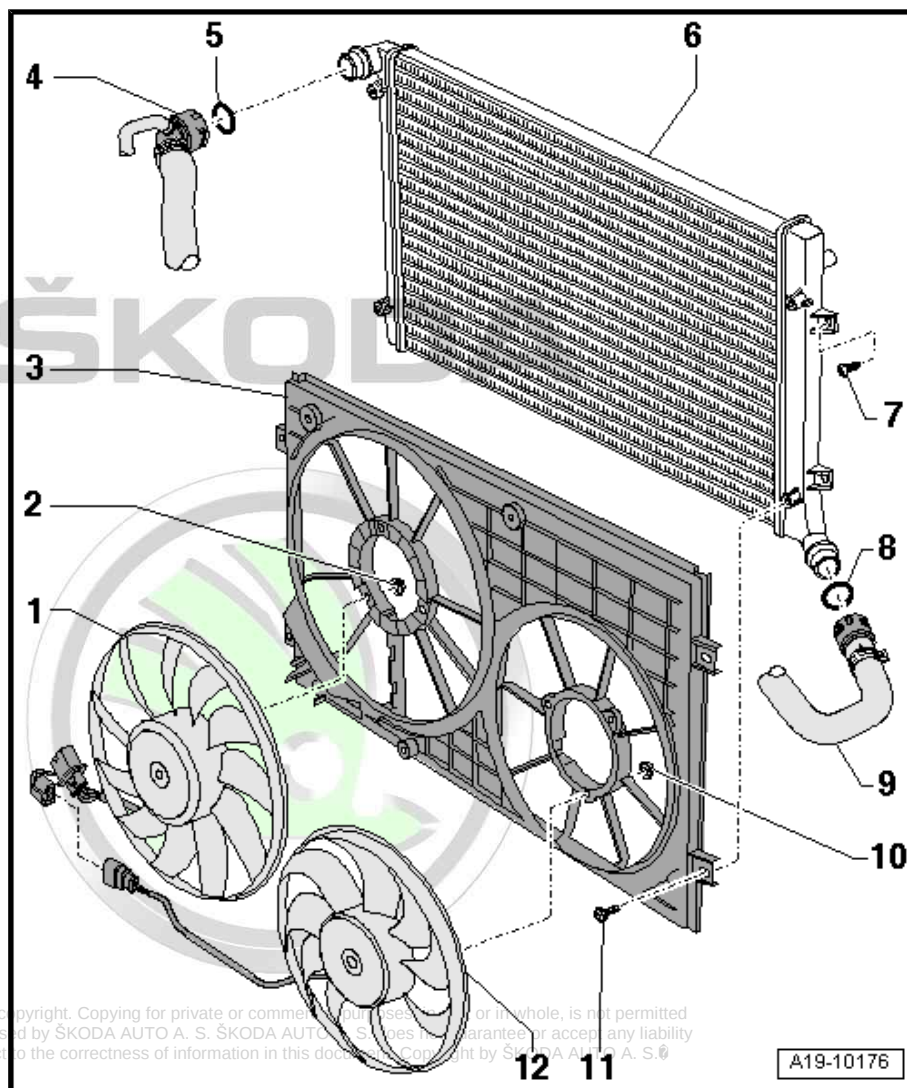
- ☐ to connecting piece for coolant regulator on cylinder block
- ☐ Connection diagram for coolant hoses ➔ [page 143](#)

10 - 5 Nm

11 - 5 Nm

12 - Right radiator fan - V35-

- ☐ Removing and installing ➔ [page 145](#)



1.8 Parts of the cooling system engine side for engines with code BMM

1 - to the coolant expansion tank at the top

- ☐ Connection diagram for coolant hoses
⇒ [page 143](#)

2 - Top coolant pipe

- ☐ screwed onto the cylinder head cover

3 - O-ring

- ☐ replace

4 - Retaining clip

- ☐ Check for secure seating

5 - Coolant temperature sender - G62-

6 - to radiator for exhaust gas recirculation

- ☐ Connection diagram for coolant hoses
⇒ [page 143](#)

7 - Connection fitting

- ☐ for cylinder head

8 - 10 Nm

9 - towards top radiator

- ☐ Connection diagram for coolant hoses
⇒ [page 143](#)

10 - from heat exchanger

- ☐ Coolant return-flow line
- ☐ Connection diagram for coolant hoses
⇒ [page 143](#)

11 - 40 Nm

12 - Distributor part

13 - from distributor part of top coolant hose

- ☐ Connection diagram for coolant hoses ⇒ [page 143](#)

14 - 15 Nm

15 - from the bottom coolant expansion tank

- ☐ Connection diagram for coolant hoses ⇒ [page 143](#)

16 - Coolant pipe

17 - Sealing ring

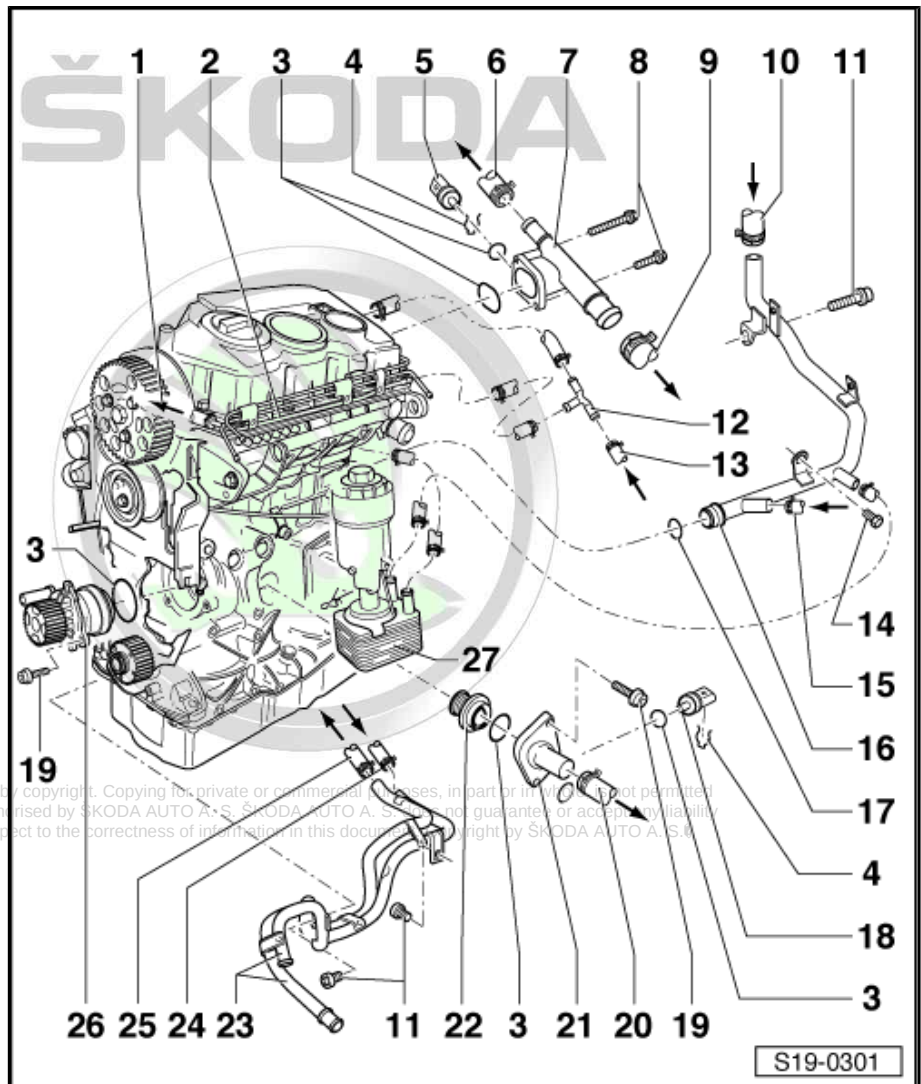
- ☐ replace

18 - Coolant temperature sender at radiator outlet - G83-

19 - 15 Nm

20 - to bottom radiator

- ☐ Connection diagram for coolant hoses ⇒ [page 143](#)





21 - Connection fitting

- ☐ with coolant regulator

22 - Coolant regulator

- ☐ Removing and installing ⇒ [page 147](#)
- ☐ check: heat up regulator in a water bath

Start of opening approx. 87 °C

completely open approx. 102°C

Stroke: at least 7 mm

23 - Coolant pipes at the back

- ☐ Vehicles with auxiliary heating
- ☐ Connection diagram for coolant hoses ⇒ [page 143](#)

24 - from radiator for exhaust gas recirculation

- ☐ Connection diagram for coolant hoses ⇒ [page 143](#)

25 - to heat exchanger

- ☐ Connection diagram for coolant hoses ⇒ [page 143](#)

26 - Coolant pump

- ☐ check smooth operation
- ☐ Check fitting position
- ☐ Removing and installing ⇒ [page 147](#)

27 - Engine oil cooler

- ☐ Removing and installing ⇒ [page 124](#)



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1.9 Connection diagram for coolant hoses for engines with code BUD

1 - Coolant expansion tank

- ☐ with cap
- ☐ Check the overpressure valve in the screw cap
⇒ [page 149](#)

2 - Radiator for exhaust gas recirculation

- ☐ After replacing, fill with fresh coolant
⇒ [page 135](#)
- ☐ Removing and installing
⇒ [page 143](#)

3 - Heat exchanger for heating

- ☐ After replacing, fill with fresh coolant
⇒ [page 143](#)

4 - ATF radiator

- ☐ for models with an automatic gearbox
- ☐ After replacing, fill with fresh coolant
⇒ [page 143](#)

5 - Cylinder head and cylinder block

- ☐ After replacing, fill with fresh coolant
⇒ [page 143](#)

6 - Top coolant hose

7 - Engine oil cooler

- ☐ After replacing, fill with fresh coolant
⇒ [page 143](#)
- ☐ Removing and installing
⇒ [page 122](#)

8 - Radiator

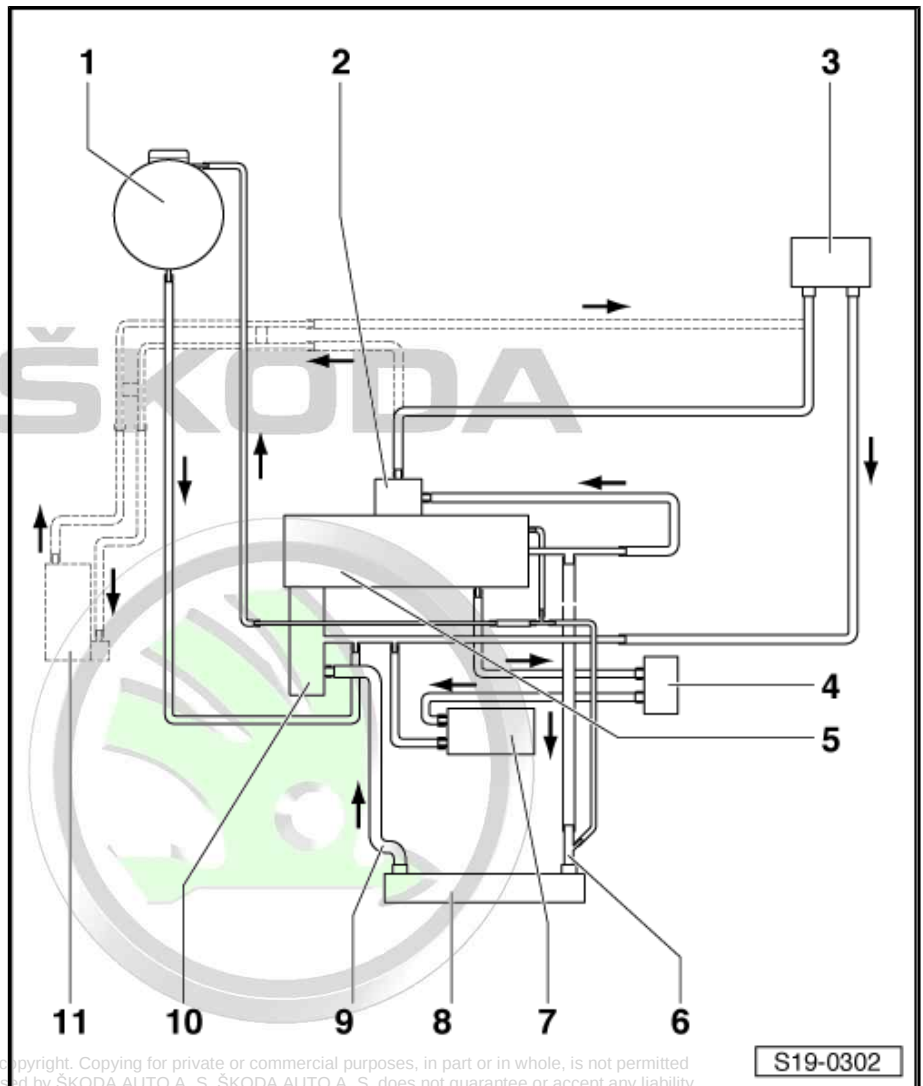
- ☐ Removing and installing ⇒ [page 146](#)
- ☐ After replacing, fill with fresh coolant ⇒ [page 143](#)

9 - Bottom coolant hose

10 - Coolant pump/coolant regulator

- ☐ Removing and installing ⇒ [page 147](#)

11 - Auxiliary heating



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1.10 Draining and topping up coolant for engines with code BMM

Special tools and workshop equipment required

- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Pliers for spring-type clips
- ◆ Refractometer - T10007-



Draining



Note

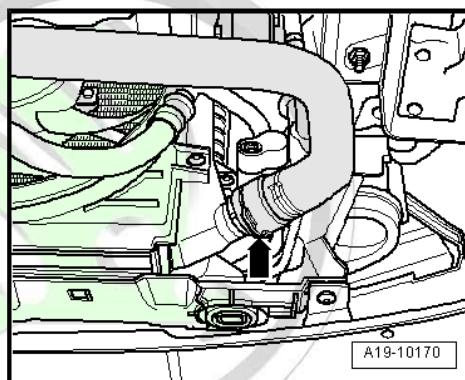
Collect drained coolant in a clean container for proper disposal or reuse.



WARNING

When opening the coolant expansion reservoir, hot steam or hot coolant may escape. Cover the cap with a cloth and open carefully.

- Open the cap of the coolant expansion reservoir.
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Place a catch pan under the engine.
- Remove the coolant hose from the radiator; to do so pull the retaining clip -arrow-.
- Remove engine cover ⇒ [page 13](#) .



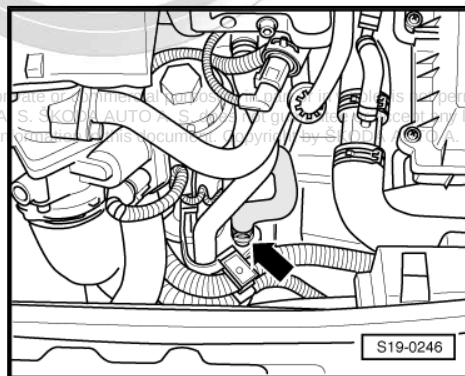
- Detach the rear coolant hose on the engine oil cooler -arrow- and drain residual coolant.

Filling up

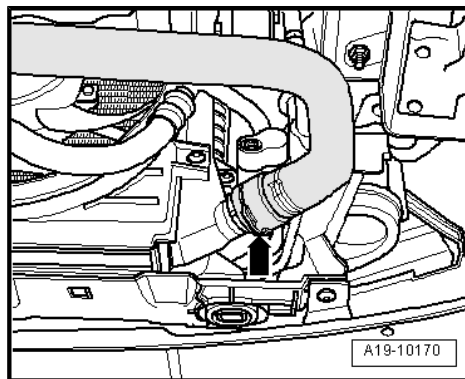


Note

Replace O-rings.



- Connect coolant hose at bottom of radiator -arrow-.

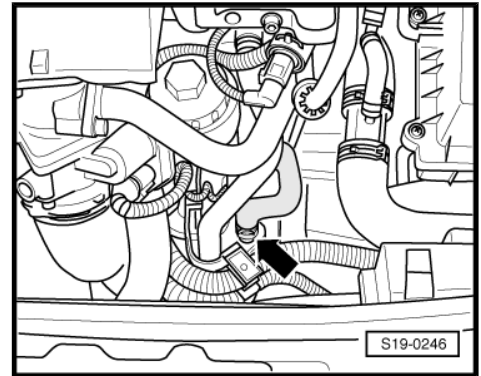


- Connect coolant hose at rear of radiator -arrow-.

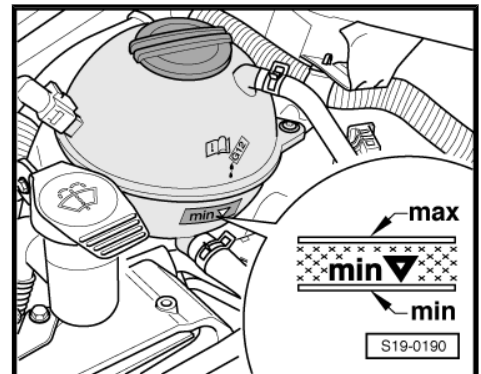
Select the appropriate coolant additive from the ⇒ Electronic Catalogue of Original Parts or from the list of allowed coolant additives ⇒ Maintenance ; Booklet Octavia II .

- In a clean reservoir mix water and coolant additive in the correct mixing ratio ⇒ Maintenance ; Booklet Octavia II .

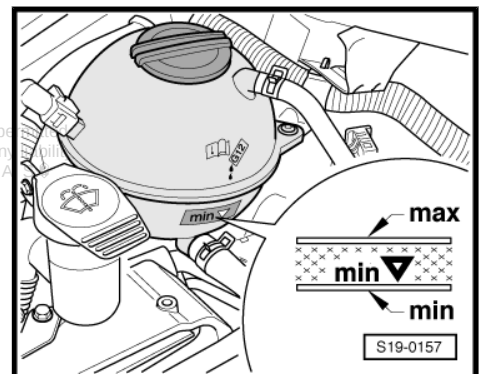
SKODA



- Top up coolant through the neck of the expansion reservoir, until it reaches the max. marking.
- Switch off the heater unit and air conditioning unit.
- Start engine and run at a speed of approx. 1500 rpm for max. 2 minutes. When doing so, fill coolant into the expansion tank up to the max. marking.
- Tighten the cap of the coolant expansion reservoir.
- Run engine until fan starts.



- Check coolant level when the expansion reservoir is closed.
- When engine is at operating temperature the coolant level must be at the maximum marking, when engine is cold between the minimum and the maximum markings.



WARNING

Hot steam may escape when the expansion reservoir is opened. Wear safety goggles and safety clothing to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.

- If necessary, top up with coolant.

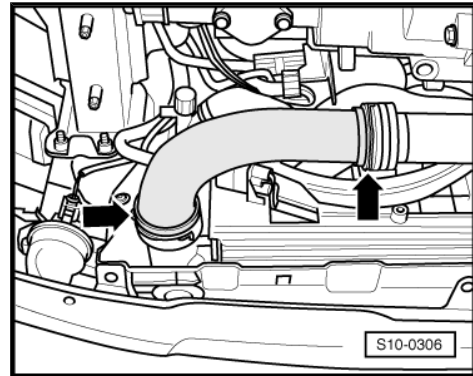
Further installation occurs in reverse order.

1.11 Fan shroud for radiator fans - V7- and - V35- for engines with code BMM Removing and installing

- Remove engine cover ⇒ [page 13](#) .
- Remove the air filter with air guide hose from the lock carrier ⇒ [page 220](#) .
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .



- Remove connecting hose on left; to do so, slightly lift retaining clips -arrows-.

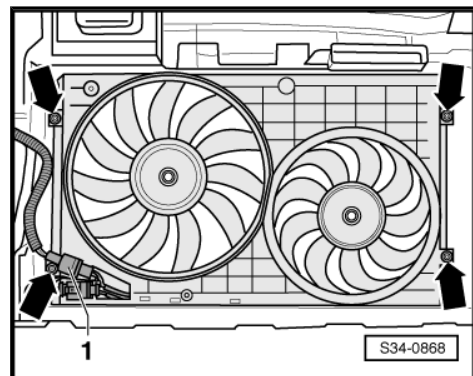


- Disconnect plug connection -1-.
- Remove screws -arrows- and take out fan shroud downwards.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ♦ Tightening torques: ➔ [page 139](#)



1.12 Removing and installing the radiator for engines with code BMM

Special tools and workshop equipment required

- ♦ Catch pan for workshop cranes , e.g. -VAS 6208-
- ♦ Pliers for spring-type clips

Removing

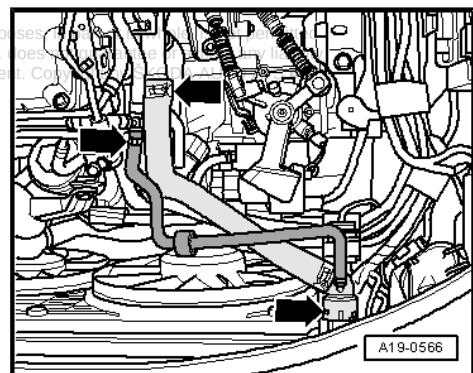
- Switch off ignition and pull out ignition key.



Note

Collect drained coolant in a clean container for proper disposal or reuse.

- Remove fan shroud for radiator fan - V7- and right radiator fan - V35 - ➔ [page 145](#) .
- Drain coolant ➔ [page 143](#) .
- Place a catch pan under the engine.
- Remove coolant hose between engine and radiator -arrows-.

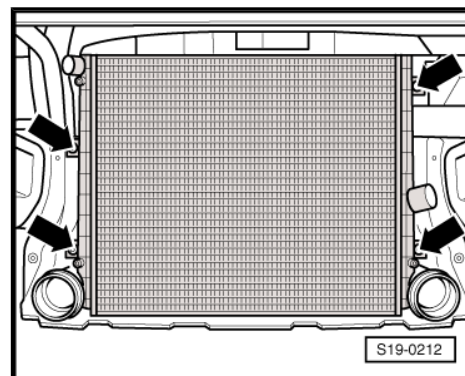


- Unscrew screws -arrows- and remove radiator downwards.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ◆ Tightening torques: ➔ [page 139](#)
- If a new radiator has been fitted, the old (drained) coolant must not be used for topping up.
- Top up coolant ➔ [page 143](#).



1.13 Removing and installing coolant pump

Removing

- Drain coolant
- ◆ Motor code BKD, AZV: ➔ [page 135](#)
- ◆ Engine code BMM: ➔ [page 143](#)
- Remove toothed belt.
- ◆ Motor code BKD, AZV: ➔ [page 26](#)
- ◆ Engine code BMM: ➔ [page 38](#)
- Unscrew fixing bolts -1- of the coolant pump and remove the coolant pump -2-.

Remove O-ring -3- for private or commercial purposes, in part or in whole, is not permitted unless authorised by ŠKODA AUTO A. S. ŠKODA AUTO A. S. does not guarantee or accept any liability for the correctness of information in this document. Copyright by ŠKODA AUTO A. S.

Installing

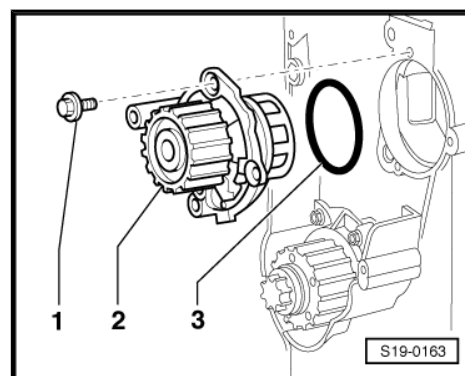
Installation occurs in reverse order to removal. Pay attention to the following:



Note

Renew O-ring.

- Clean sealing surface for O-ring or smoothen.
- Moisten the new O-ring -3- with coolant.
- Attach the coolant pump -2-.
- Fitting position: Plug in housing points down.
- Tighten screws -1- of coolant pump to 15 Nm.



1.14 Removing and installing coolant regulator

Special tools and workshop equipment required

- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Pliers for spring-type clips

Removing

- Disconnect battery ➔ Electrical System ➔ Rep. gr. 27 .
- Drain coolant
- ◆ Motor code BKD, AZV: ➔ [page 135](#)
- ◆ Engine code BMM: ➔ [page 143](#)



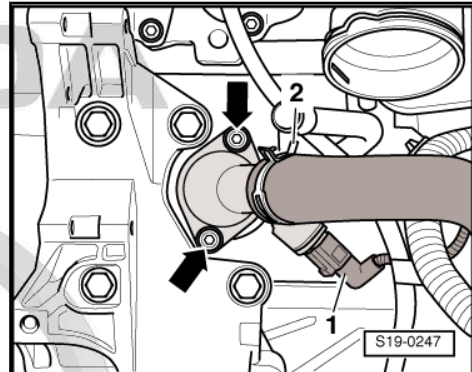
- Remove V-ribbed belt ➔ [page 23](#) .



Note

Mark the direction of rotation with chalk or a felt-tip pen before removing the V-ribbed belt. Reversing the rotation direction of an already used belt may destroy it.

- Unscrew alternator ➔ Electrical System ➔ Rep. gr. 27 and place it at the top right-hand side. The hoses remain connected.
- Detach coolant hose -2- from connecting piece.
- Disconnect plug -1- at the coolant temperature sender at radiator outlet - G83- .
- Screw out screws -arrows- and remove connection fittings.



- Turn coolant regulator -1- approx. 90° (1/4 turn) anti-clockwise -arrow- and remove from connecting piece.
- Remove O-ring -2-.

Installing

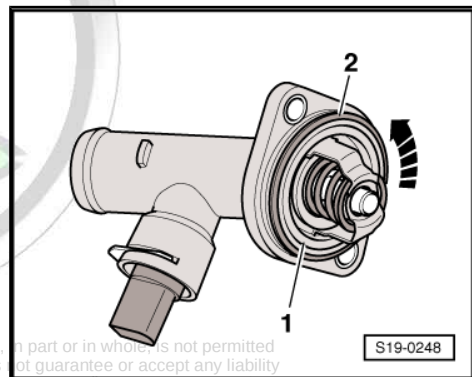
Installation occurs in reverse order to removal. Pay attention to the following:



Note

Renew O-ring.

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- Clean sealing surface for O-ring or smoothen.
- Insert coolant regulator with new O-ring.
- Installation position: The bracket of the coolant regulator must be positioned vertically.
- Moisten O-ring with coolant.
- Install the connecting piece on the cylinder block, tighten the screws to 15 Nm and connect the hose from the radiator.
- Install alternator ➔ Electrical System ➔ Rep. gr. 27 .
- Carry out cohesive work when reconnecting the battery ➔ Electrical System ➔ Rep. gr. 27 .

1.15 Check cooling system for leaks

Special tools and workshop equipment required

- ◆ Cooling system testing device , e.g. -V.A.G 1274-
- ◆ Adapter e.g. -V.A.G 1274/8 -
- ◆ Adapter e.g. -V.A.G 1274/9 -

Test condition

- Engine must be warm.

Test sequence



WARNING

When opening the coolant expansion reservoir, hot steam or hot coolant may escape. Cover the cap with a cloth and open carefully.

- Open the cap of the coolant expansion reservoir.
- Fit the cooling system testing device - V.A.G 1274 - onto the coolant expansion tank using adapter - V.A.G 1274/8- .
- Generate an overpressure of approx. 0.1 MPa (1.0 bar) to test the cooling system.

If pressure drops:

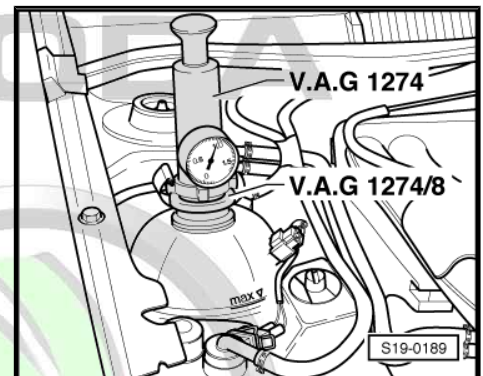
- Search position of the leak and repair fault.

Testing the pressure relief valve in the cap

- Fit the cooling system testing device - V.A.G 1274 - onto the coolant expansion tank using adapter - V.A.G 1274/9- .
- To check the pressure relief valve, create an overpressure.
- The pressure relief valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).

If the pressure relief valve does not open:

- Renew cap.



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20 – Fuel supply system

1 Removing and installing parts of the fuel supply system



Note

- ♦ Fuel lines are secured with quick-release couplings.
- ♦ Fuel hoses must be secured only with spring strap clips. The use of clamp-type or screw-type clips is not allowed.
- ♦ Spring-type clip pliers are recommended for installation of spring-type clips.

Observe the safety instructions ➔ [page 3](#) .

Observe rules for cleanliness ➔ [page 4](#) .

1.1 Fuel tank with attached parts for vehicles with front-wheel drive

1 - Mounting part

2 - Screw cap

- ☐ replace the O-ring if it is damaged

3 - Earth connection

4 - 11 Nm

5 - Mounting bracket

6 - Fuel tank

- ☐ when removing, support using the engine/gear-box jack , e.g. -V.A.G 1383 A-
- ☐ Removing and installing ➔ [page 157](#)

7 - 25 Nm

- ☐ replace

8 - Circlip

9 - Tensioning strap

- ☐ Check fitting position

10 - Heat shield

11 - Fuel cooler

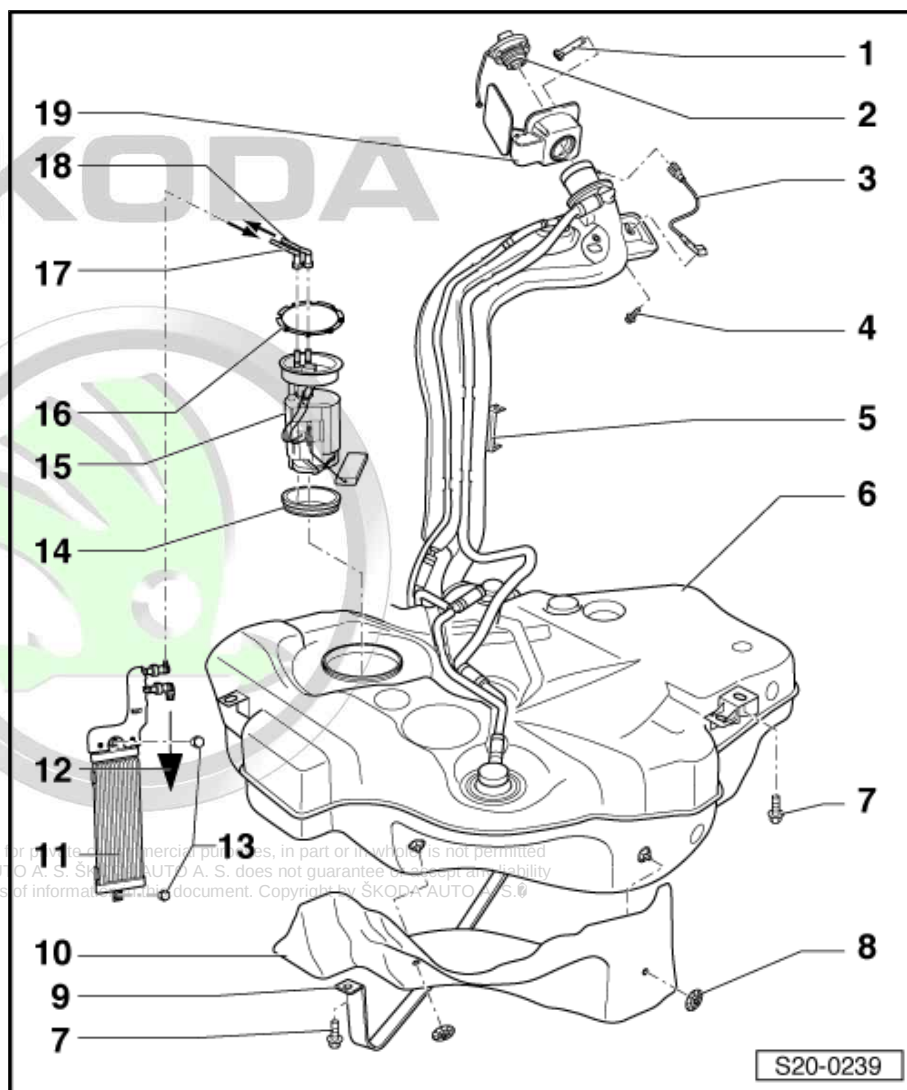
- ☐ Removing and installing ➔ [page 157](#)

12 - to fuel filter

13 - 20 Nm

14 - Sealing ring

- ☐ replace
- ☐ to be inserted dry into



the opening of the fuel tank

- ☐ only moisten the inner seal of the flange with fuel for fitting purposes

15 - Fuel pump

- ☐ with sender for fuel gauge display
- ☐ Removing and installing ⇒ [page 161](#)
- ☐ Note installation position on the fuel tank ⇒ [page 151](#)
- ☐ Check ⇒ [page 179](#)
- ☐ Clean strainer if dirty
- ☐ removing and installing the sender for fuel gauge ⇒ [page 167](#)

16 - Lock ring - 110 Nm

- ☐ use wrench -T30101 (3087)- for removing and installing
- ☐ check for firm seating

17 - Fuel return-flow line

- ☐ from fuel cooler
- ☐ clipped in place on fuel tank
- ☐ check for firm seating
- ☐ blue

18 - fuel feed line

- ☐ to fuel filter
- ☐ clipped in place on fuel tank
- ☐ check for firm seating
- ☐ black

19 - Fuel tank lid unit

- ☐ with rubber bowl
- ☐ removing and installing ⇒ Body Work ⇒ Rep. gr. 55

Fitting location of the fuel delivery unit

The marking -3- on the flange of the fuel delivery unit points against the direction of travel.

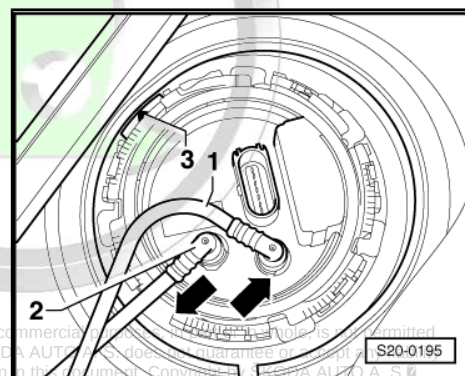


Note

The fuel delivery unit can only be installed in this position.

Blue or blue marked fuel return-flow line -1-.

Black fuel supply line -2-,



Note

After installing the fuel delivery unit, check whether the feed line and the return-flow line are clipped correctly in place on the fuel tank.



1.2 Fuel tank with attached parts for vehicles with four-wheel drive

1 - Fuel return-flow line

- ☐ from fuel cooler
- ☐ clipped in place on fuel tank
- ☐ check for firm seating
- ☐ blue (blue marking)

2 - fuel feed line

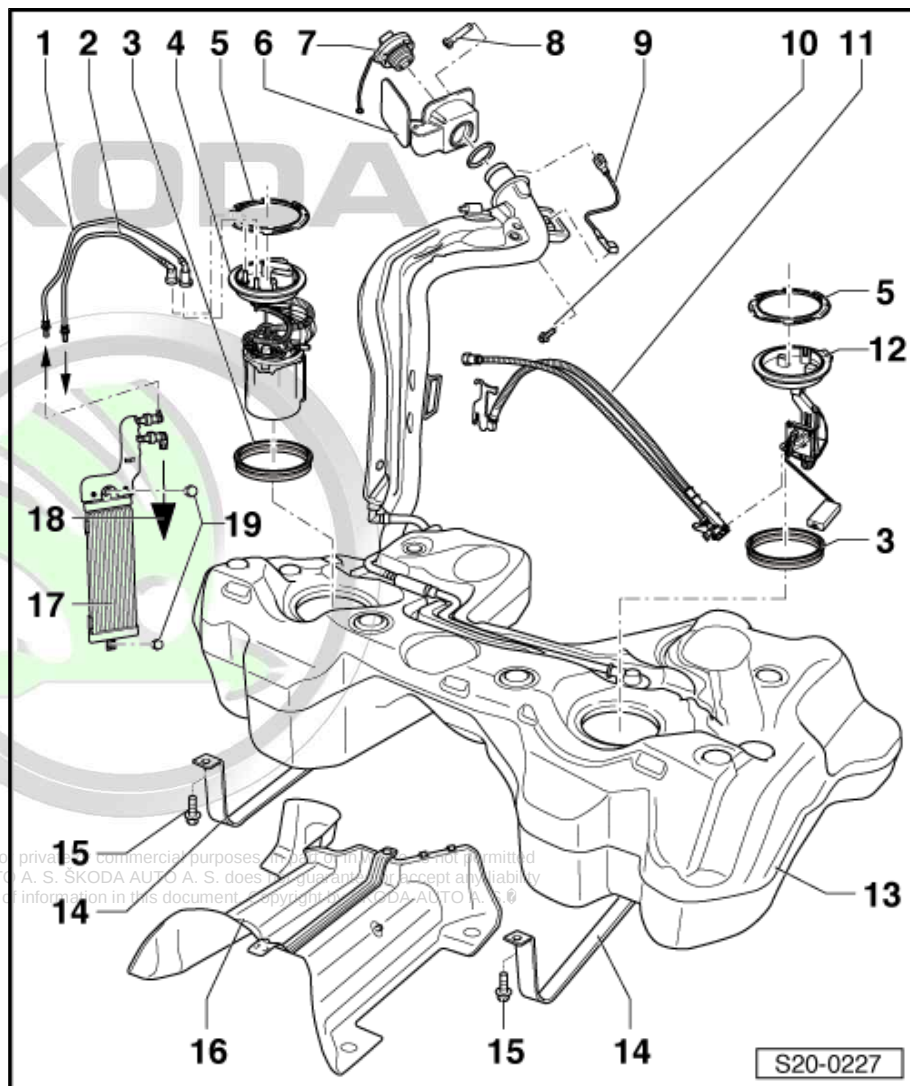
- ☐ to fuel filter
- ☐ clipped in place on fuel tank
- ☐ check for firm seating
- ☐ black

3 - Sealing ring

- ☐ replace
- ☐ to be inserted dry into the opening of the fuel tank
- ☐ only moisten the flange with fuel from inside for installation purposes

4 - Fuel pump

- ☐ with fuel gauge sender - G -
- ☐ Removing and installing ➔ [page 162](#)
- ☐ Note installation position on the fuel tank ➔ [page 153](#)
- ☐ Check ➔ [page 179](#)
- ☐ Clean strainer if dirty
- ☐ Removing and installing



the fuel gauge sender -
G- ➤ [page 167](#)

5 - Lock ring, 110 Nm

- ☐ use wrench - T30101 (3087)- for removing and installing
- ☐ check for firm seating

6 - Fuel tank lid unit

- ☐ with rubber bowl
- ☐ removing and installing ➤ Body Work ➤ Rep. gr. 55

7 - Screw cap

8 - Mounting part

9 - Earth connection

- ☐ check for firm seating

10 - 10 Nm

11 - Suction spray pump

- ☐ connected to the fuel gauge sender 2 - G169-
- ☐ Removing and installing ➤ [page 170](#)

12 - Fuel gauge sender - G169-

- ☐ Note installation position on the fuel tank ➤ [page 153](#)
- ☐ Removing and installing ➤ [page 169](#)

13 - Fuel tank

- ☐ when removing, support using the engine/gearbox jack , e.g. -V.A.G 1383 A-
- ☐ Removing and installing ➤ [page 159](#)

14 - Tensioning strap

- ☐ Check fitting position

15 - 25 Nm

- ☐ replace

16 - Heat shield

17 - Fuel cooler

- ☐ Removing and installing ➤ [page 157](#)

18 - to fuel filter

19 - 20 Nm

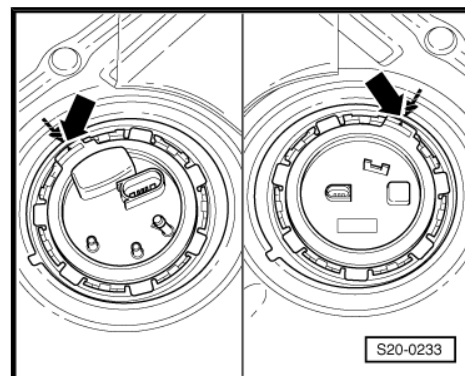
Installation position of the fuel delivery unit (with fuel gauge sender - G-) and with fuel gauge sender 2 - G169-

The markings on the flanges must be aligned with markings on the fuel tank -arrows-



Note

The markings on the fuel tank are hardly visible.





1.3 Removing and installing fuel filter

Fuel filter type one and two



Note

Before disconnecting the fuel hoses, mark assignment to the supports.

1 - Fuel intake hose

- ☐ from fuel tank
- ☐ white or white marking

2 - 9 Nm

3 - Return-flow hose

- ☐ to fuel cooler
- ☐ blue/blue marking

4 - Drain plug

- ☐ Unscrew and drain off (collect) about 0.1 litre of liquid using a hand vacuum pump, e.g. - V.A.G 1390- or - VAS 5226- and bleed tank, e.g. -V.A.G 1390/1- .

5 - Sealing ring

- ☐ replace

6 - Fuel intake hose

- ☐ to the tandem pump
- ☐ white marking

7 - Fuel filter - top part

8 - Retaining clip

- ☐ Replace if damaged.

9 - Fuel temperature sender - G81-

10 - Return-flow hose

- ☐ from the tandem pump
- ☐ blue marking
- ☐ with connection fitting for fuel temperature sender - G81-

11 - Fuel filter element

- ☐ Keep to change intervals ⇒ Maintenance ; Booklet Octavia II.

12 - Fuel filter with integrated bracket - bottom part.

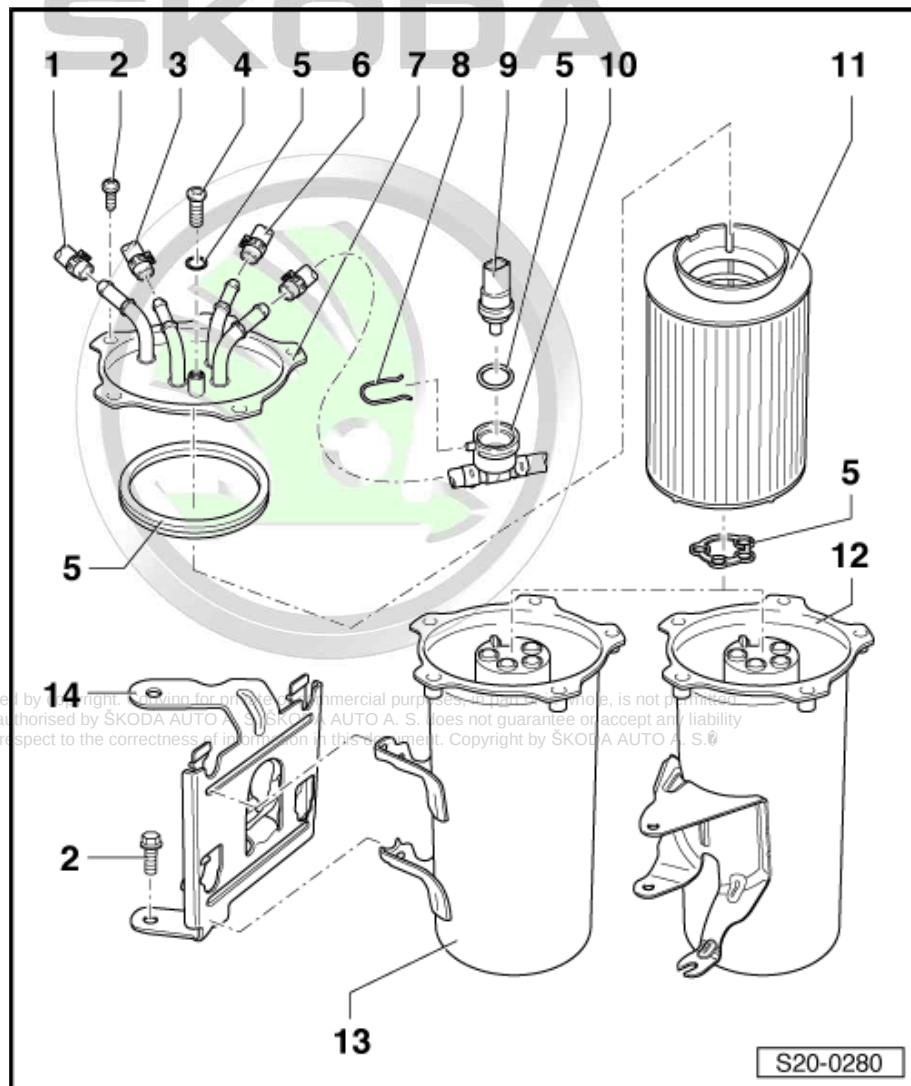
- ☐ installed from 08.05

13 - Fuel filter - lower part

- ☐ installed until 08.05

14 - Mounting bracket

- ☐ installed until 08.05



Fuel filter type three and four



Note

Before disconnecting the fuel hoses, mark assignment to the supports.

1 - Fuel intake hose

- ☐ from fuel tank
- ☐ white marking

2 - Return-flow hose

- ☐ to fuel cooler
- ☐ blue marking

3 - Fuel intake hose

- ☐ to the tandem pump
- ☐ white marking

4 - Screw

- ☐ for type 3 (left part of the figure): 9 Nm
- ☐ for type 4 (right part of the figure): 5 Nm

5 - Retaining clip

- ☐ Replace if damaged.

6 - Fuel temperature sender - G81-

7 - Sealing ring

- ☐ replace

8 - Return-flow hose

- ☐ from the tandem pump
- ☐ blue marking
- ☐ with connection fitting for fuel temperature sender - G81-

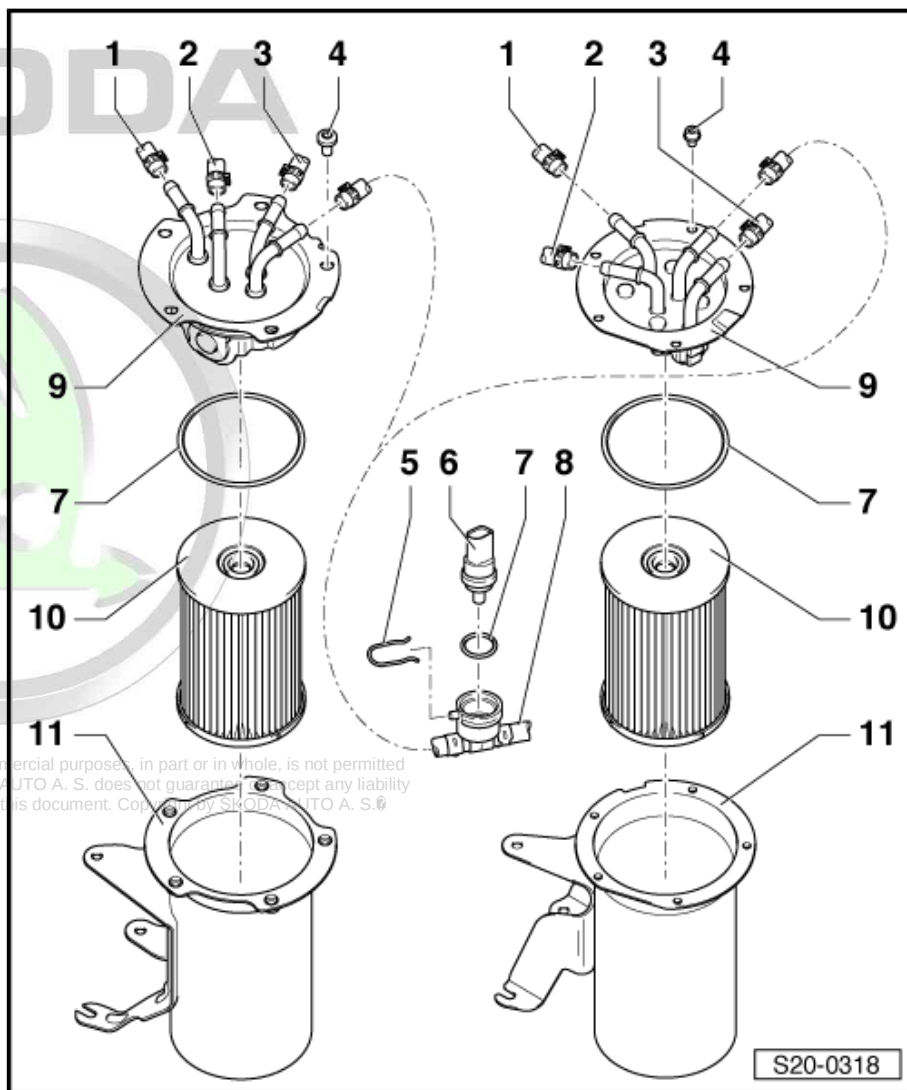
9 - Fuel filter - top part

- ☐ with integrated preheating valve

10 - Filter element

- ☐ Keep to change intervals ⇒ Maintenance ; Booklet Octavia II.
- ☐ Pay attention to the part number

11 - Fuel filter with integrated bracket - bottom part.



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1.4 Extract fuel from the fuel tank

Special tools and workshop equipment required

- ◆ Hose adapter , e. g. -V.A.G 1318-16 -
- ◆ Adapter e.g. -V.A.G 1318-17-
- ◆ Auxiliary measuring set, , e. g. -V.A.G 1594 C-
- ◆ Battery
- ◆ Fuel tank



Note

If there are functional problems of the fuel delivery unit suction off fuel with fuel extraction device, e.g. -VAS 5190-.

Work procedure



Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe the regulations concerning cleanliness when working on the fuel supply/injection system* ⇒ [page 4](#).
- Switch off ignition and pull out ignition key.
- Removing rear seat bench ⇒ Body Work ⇒ Rep. gr. 72.
- Remove the cover from the fuel delivery unit.



Note

On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.

- Unplug the 5-pin connector -1- and the black fuel feed line -2-.



Note

- ◆ *On vehicles with four-wheel drive, the position of the plugs and the fuel lines is different.*
- ◆ *Press in the securing ring in order to unlock the line.*

- Connect adapters -V.A.G 1318/16- and -V.A.G 1318/17 - and fit this “drain pipe” onto the feed support of the fuel delivery unit.
- Hold the “drain pipe” in a suitable catch pan for fuel.
- Connect the battery and the contacts of the fuel pump with auxiliary cables -A- from the auxiliary measuring set - V.A.G 1594/C- as follows:

Battery positive terminal (+) to contact -1- of the fuel pump.

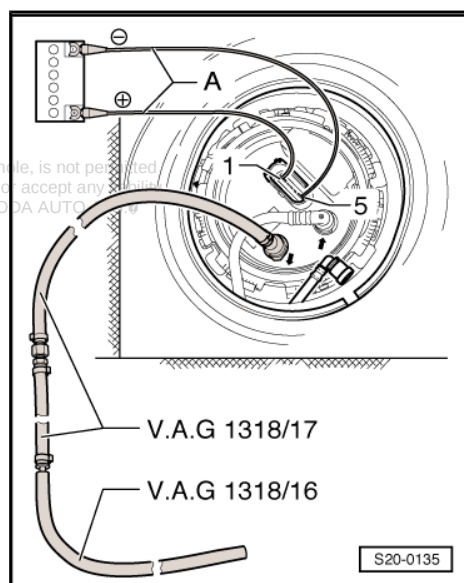
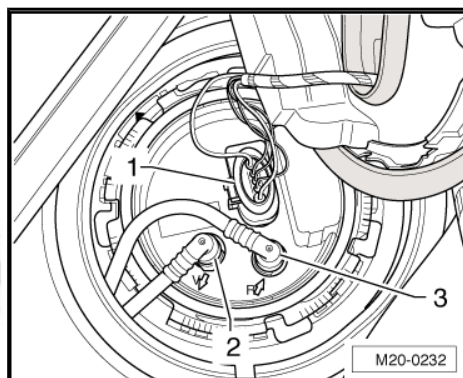
Battery negative terminal (-) to contact -5- of fuel pump.

The fuel pump runs and suctions off fuel.



WARNING

In order to prevent an overflow of fuel in case of a too small fuel tank, the fuel pump must not run unattended.



1.5 Removing and installing fuel cooler

Removing



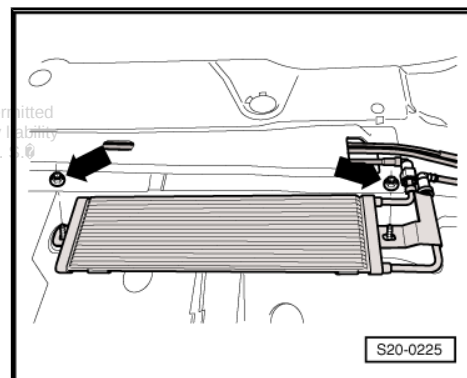
Note

- ◆ *The fuel cooler is located on the fuel return-flow line to the fuel tank. It is attached to the underfloor of the vehicle body.*
- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ◆ *Observe rules for cleanliness* ⇒ [page 4](#) .
- Switch off ignition and pull out ignition key.
- Removing the right underfloor trim panel.
- Separate fuel lines at fuel cooler.
- Unscrew fixing nuts for fuel cooler -arrows- and remove fuel cooler.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Tighten fixing nuts for the fuel cooler to 15 Nm.



1.6 Remove and install the fuel tank for vehicles with front-wheel drive

Special tools and workshop equipment required

- ◆ Engine/gearbox jack , e.g. - V.A.G 1383 A-

Removing



Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ◆ *Observe the regulations concerning cleanliness when working on the fuel supply/injection system* ⇒ [page 4](#) .
- Switch off ignition and pull out ignition key.
- Drain the fuel tank ⇒ [page 155](#) .
- Removing rear seat bench ⇒ Body Work ⇒ Rep. gr. 72 .



- Unclip retaining catches -arrows- of cover for the fuel delivery unit and remove cover.

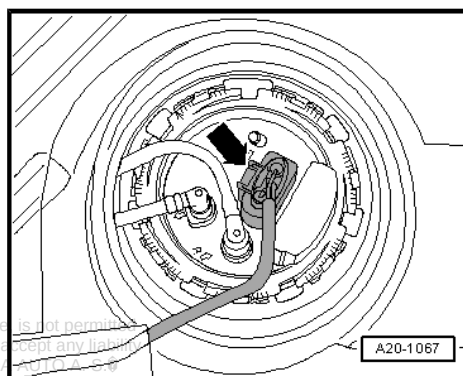
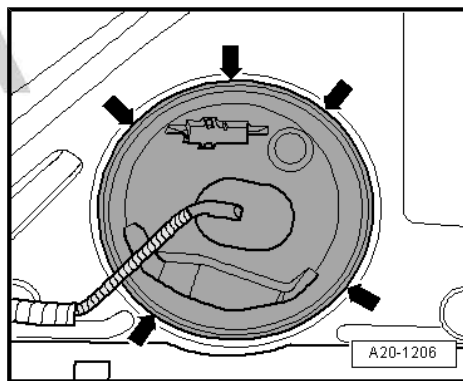


Note

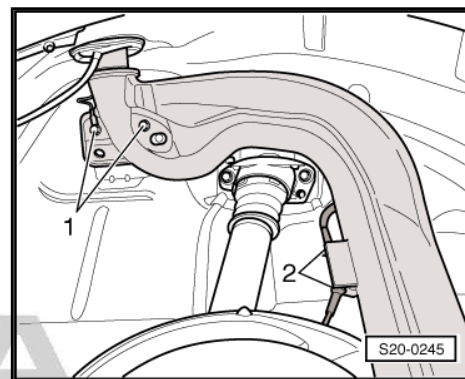
On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.

- Unplug connector -arrow-.
- Remove right rear wheel ⇒ Chassis ⇒ Rep. gr. 44 .
- Open the fuel tank cap and clean around the fuel filler neck.
- Unscrew the cap from the fuel filler neck.
- Seal the opening with a clean piece of foam to prevent the ingress of foreign bodies.
- Remove the rear right wheelhouse liner ⇒ Body Work ⇒ Rep. gr. 66 .

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- Remove screws -1- for filler neck on the body.
- Unclip the wiring loom from the holder -2- at the top and bottom of the filler neck.
- Remove rear tunnel bridge ➔ [page 229](#) .
- Slacken front clamping sleeve at exhaust sleeve and push clamping sleeve to the rear.
- Slacken all the suspensions of the middle and rear part of the exhaust system from the retaining straps.
- Slightly lower the middle and rear part of the exhaust system and tie with wire to the body.
- Disconnect the feed line and the return-flow line on the front right of the fuel tank.



i Note

- ◆ *On vehicles with auxiliary heating, the fuel line for the dosing pump - V54- must also be disconnected.*
- ◆ *Press down the securing rings in order to unlock the connections of the fuel lines.*
- Unscrew tensioning strap.
- Support the fuel tank using the engine/gearbox jack - V.A.G 1383 A- .
- Unscrew securing bolts.
- Lower the fuel tank.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ◆ **Install the fuel lines without kinks.**
- ◆ Do not mix-up the fuel feed line (black) and the fuel return-flow line (blue).
- ◆ Make sure the fuel line connections fit tightly.
- ◆ Check feed line and return-flow line at fuel tank for firm seating.
- ◆ Check earth connection of fuel tank/body at filler neck.

1.7 Removing and installing fuel tank for vehicles with four-wheel drive

Special tools and workshop equipment required

- ◆ Engine/gearbox jack , e.g. - V.A.G 1383 A-

Removing

i Note

- ◆ *Safety precautions when working on the fuel supply system ➔ [page 3](#) .*
- ◆ *Observe the regulations concerning cleanliness when working on the fuel supply/injection system ➔ [page 4](#) .*
- Switch off ignition and pull out ignition key.



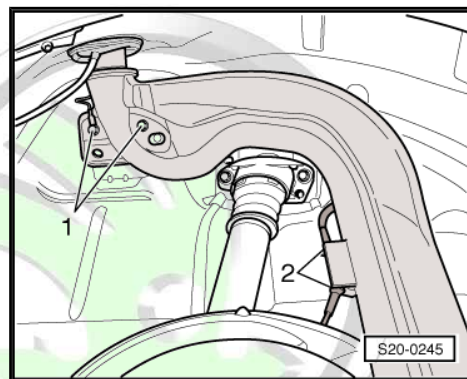
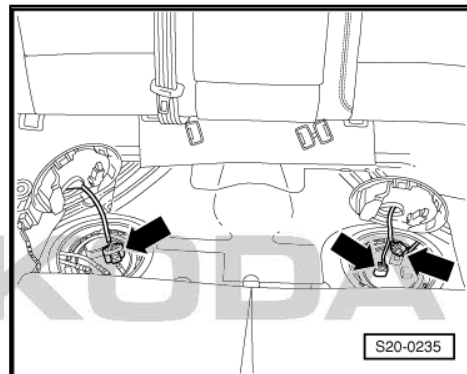
- Drain the fuel tank ➔ [page 155](#) .
- Removing rear seat bench ➔ Body Work ➔ Rep. gr. 72 .
- Remove the covers from the fuel delivery unit and from the fuel gauge sender 2 - G169- .



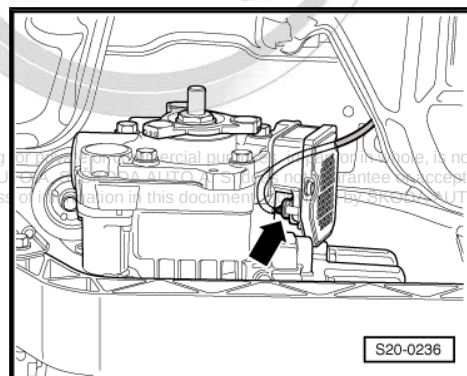
Note

On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.

- Remove the plug from the fuel delivery unit and from the fuel gauge sender 2 - G169- -arrows-.
- Remove right rear wheel ➔ Chassis ➔ Rep. gr. 44 .
- Open the fuel tank cap and clean around the fuel filler neck.
- Unscrew the cap from the fuel filler neck.
- Seal the opening with a clean piece of foam to prevent the ingress of foreign bodies.
- Remove the rear right wheelhouse liner ➔ Body Work ➔ Rep. gr. 66 .
- Remove screws -1- for filler neck on the body.
- Unclip the wiring loom from the holder -2- at the top and bottom of the filler neck.
- Remove middle and rear part of exhaust system ➔ [page 233](#) .
- Remove propshaft ➔ Gearbox ➔ Rep. gr. 39 .



- Disconnect plug from four-wheel drive control unit - J492- -arrow-.
- Disconnect the feed line and the return-flow line on the front right of the fuel tank.



Note

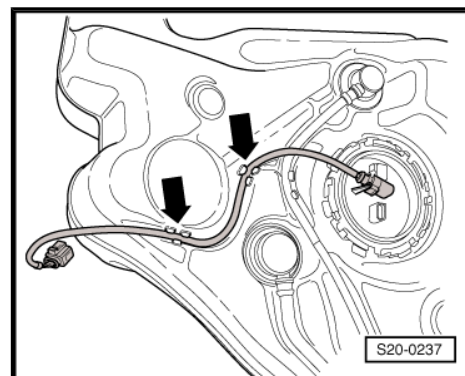
- ◆ *On vehicles with auxiliary heating, the fuel line for the dosing pump - V54- must also be disconnected.*
- ◆ *Press down the securing rings in order to unlock the connections of the fuel lines.*

- Unscrew the straps.
- Support the fuel tank using the engine/gearbox jack - V.A.G 1383 A- .
- Unscrew securing bolts.
- Lower the fuel tank.

Installing

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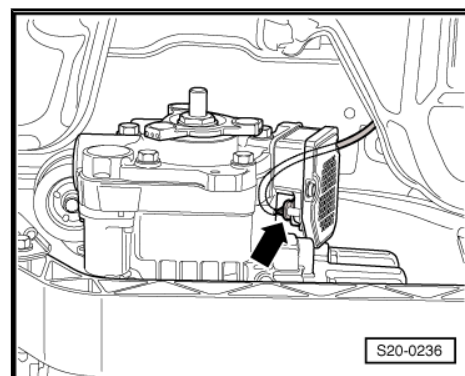
- Attach line for four-wheel drive control unit - J492- to the fuel tank -arrows-. To do so, support the fuel tank with the engine/gearbox jack .
- Raise fuel tank in its installation position and install.



- Connect the plug to the four-wheel drive control unit - J492- -arrow-.

Installation occurs in reverse order to removal. Pay attention to the following:

- ◆ Install the fuel lines without kinks.
- ◆ Do not mix-up the fuel feed line (black) and the fuel return-flow line (blue).
- ◆ Make sure the fuel line connections fit tightly.
- ◆ Check feed line and return-flow line at fuel tank for firm seating.
- ◆ Check earth connection of fuel tank/body at filler neck.



1.8 Removing and installing the fuel delivery unit on vehicles with front-wheel drive

Special tools and workshop equipment required

- ◆ Wrench for the lock ring - T30101 (3087) -

Condition

- The fuel tank must not be more than $\frac{3}{4}$ full.

Removing



Note

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- ◆ **Drain the fuel tank** ⇒ [page 155](#).
- ◆ **Safety precautions when working on the fuel supply system** ⇒ [page 3](#).
- ◆ **Observe the regulations concerning cleanliness when working on the fuel supply/injection system** ⇒ [page 4](#).
- Switch off ignition and pull out ignition key.
- Removing rear seat bench ⇒ Body Work ⇒ Rep. gr. 72 .
- Remove the cover from the fuel delivery unit.



Note

On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.

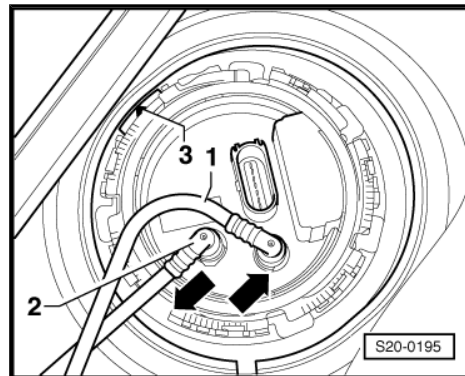


- Disconnect the plug as well as the black fuel feed line -2- and the blue fuel return-flow line -1- from the flange.



Note

- ♦ Press in the securing ring in order to unlock the line.
- ♦ For vehicles with auxiliary heating the suction hose for the dosing pump - V54- must be pulled out additionally (open lower clamp).



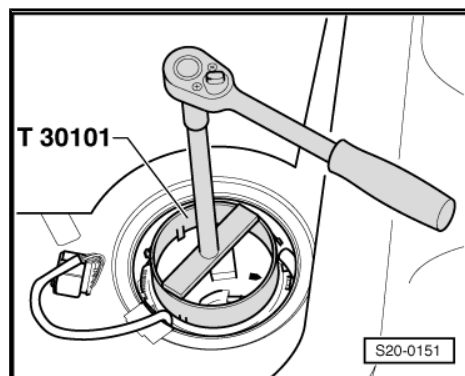
- Open lock ring with the wrench - T30101 - .



Note

When removing the fuel delivery unit, ensure that the float arm of the fuel gauge sender - G- is not bent.

- Pull the fuel delivery unit and the sealing ring out of the opening of the fuel tank.



Note

You must empty the old fuel delivery unit before disposing of it if you wish to replace it.

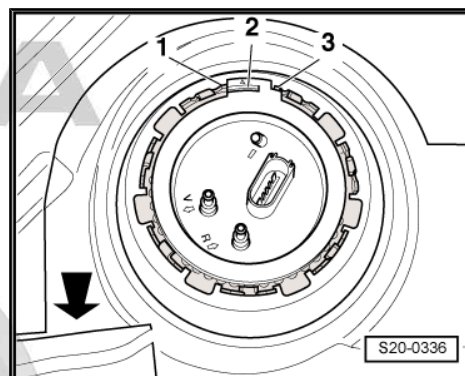
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Note

- ♦ Insert new dry sealing ring into the opening of the fuel tank.
- ♦ The gasket must only be moistened from inside with fuel before assembly of the fuel pump.
- ♦ Do not bend the sender for fuel gauge display when installing it.
- ♦ Observe the fitting location of the fuel delivery unit. The marking -3- on the flange must point against the direction of travel. The fuel delivery unit can only be installed in this position.
- ♦ Do not interchange feed line and return-flow line.
- ♦ Tighten the lock ring to 110 Nm.
- ♦ Make sure the fuel lines fit tightly.
- ♦ After installing the fuel delivery unit, check whether the feed line and the return-flow line are clipped correctly in place on the fuel tank.



1.9 Removing and installing the fuel delivery unit on vehicles with four-wheel drive

Special tools and workshop equipment required

- ♦ Wrench for the lock ring - T30101 (3087) -

- ◆ Protective gloves

Condition

- The fuel tank must not be more than $\frac{1}{3}$ full.

Removing



Note

- ◆ Drain the fuel tank ➔ [page 155](#).
- ◆ Safety precautions when working on the fuel supply system ➔ [page 3](#).
- ◆ Observe the regulations concerning cleanliness when working on the fuel supply/injection system ➔ [page 4](#).
- Switch off ignition and pull out ignition key.
- Removing rear seat bench ➔ Body Work ➔ Rep. gr. 72.
- Remove the cover from the fuel delivery unit.



Note

- ◆ On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.
- ◆ Two types of fuel delivery units are installed in the vehicles, which can be recognized on the different flanges.

Fuel delivery unit type one

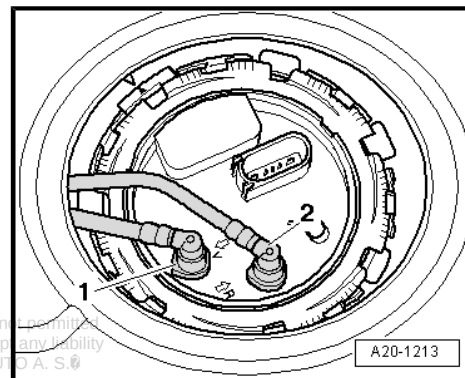
- Disconnect the plug as well as the black fuel feed line -1- and the blue fuel return-flow line -2- from the flange.



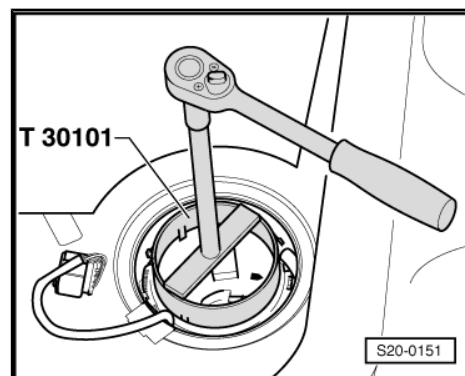
Note

- ◆ Press in the securing ring in order to unlock the line.
- ◆ For vehicles with auxiliary heating the suction hose for the dosing pump - V54- must be pulled out additionally (open lower clamp).

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- Open lock ring with the wrench - T30101 - .
- Pull closing flange and gasket ring for fuel pump out of the opening of the fuel tank and place to the side with the connected lines.





- Through the opening of the fuel tank, disconnect the fuel line -1- to the vacuum pump by pressing the release button.
- Unhook the fuel delivery line -2- at the fuel delivery unit, to do so pull the fixing clamp upwards -arrow-.



Note

- ◆ *You must wear protective gloves for removing the fuel delivery unit.*
- ◆ *Remove fuel pump from the fuel tank so that the electric cables and fuel hoses are not damaged and the float arm of the sender for fuel gauge display - G- is not bent.*
- ◆ *You must empty the old fuel delivery unit before disposing of it if you wish to replace it.*

- Pull the fuel delivery unit out of the opening of the fuel tank.

Fuel delivery unit type two

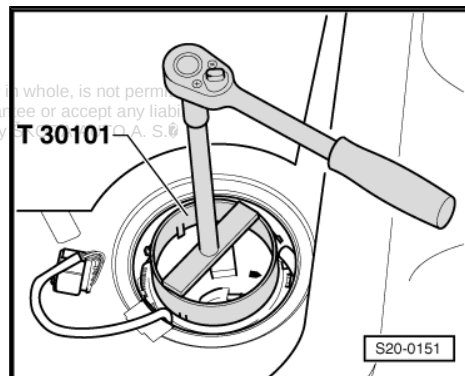
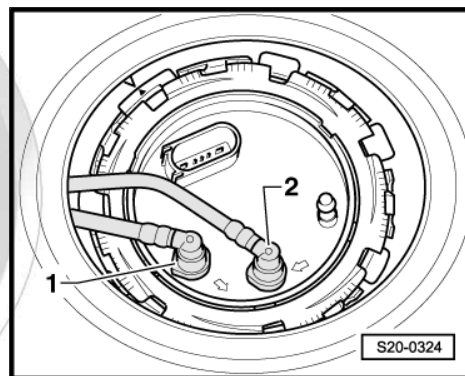
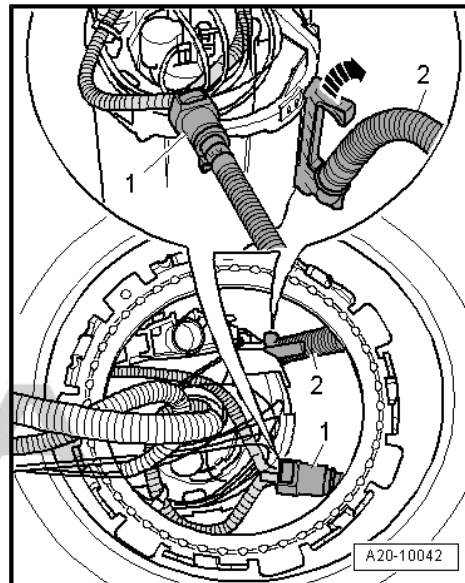
- Disconnect the plug as well as the black fuel feed line -1- and the blue fuel return-flow line -2- from the flange.



Note

- ◆ *Press in the securing ring in order to unlock the line.*
- ◆ *For vehicles with auxiliary heating the suction hose for the dosing pump - V54- must be pulled out additionally (open lower clamp).*

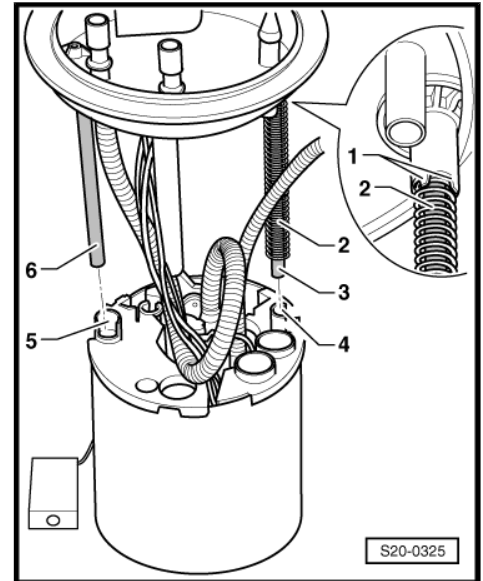
- Open lock ring with the wrench - T30101 - .



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- Slightly raise the closing flange and check if the spring -2- is still fastened on the flange -1-.
- If the spring -2- lies loose on the guide pipe -3-, hold the spring with the fingers when removing the closing flange.
- Pull closing flange and gasket ring for fuel pump out of the opening of the fuel tank and place to the side with the connected lines.

ŠKODA



- Through the opening of the fuel tank, disconnect the fuel line -1- to the vacuum pump by pressing the release button.
- Remove the fuel delivery line -2- from the fuel delivery unit.



Note

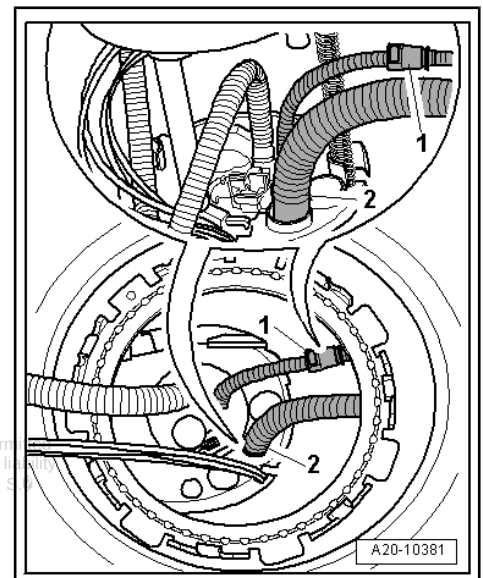
- ◆ *You must wear protective gloves for removing the fuel delivery unit.*
- ◆ *Remove fuel pump from the fuel tank so that the electric cables and fuel hoses are not damaged and the float arm of the sender for fuel gauge display - G- is not bent.*
- ◆ *You must empty the old fuel delivery unit before disposing of it if you wish to replace it.*
- Pull the fuel delivery unit out of the opening of the fuel tank.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Insert the fuel delivery unit into the fuel tank with the closing flange placed to the side. Do not bend the float arm of the fuel gauge sender unit - G- while doing so.
- Install the fuel delivery line as well as the fuel line.
- Insert the new dry gasket ring for the flange into the opening of the fuel tank and moisten only from the inside with fuel for installing the closing flange.

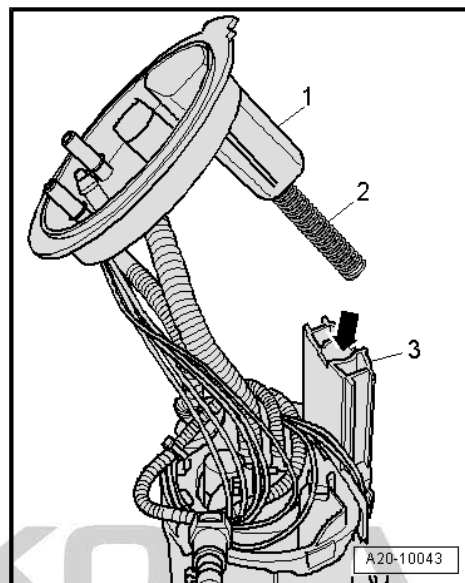
Fuel delivery unit type one



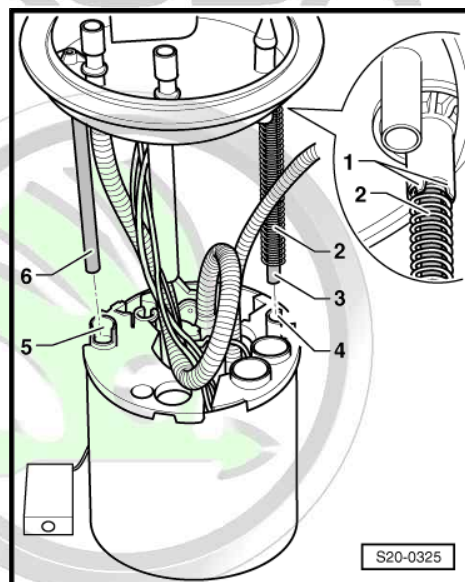


- Slide the spring -2- into the guide bore -arrow- and fit the cable -1- of the closing flange on the cable -3- of the fuel delivery unit.

Fuel delivery unit type two



- The spring -2- must be fastened to the retaining lugs -1- of the closing flange.
- First of all guide the guide pipe -3- into the guide bore -4-.
- Then lower the closing flange in such a way that the guide pipe -6- locks into the guide bore -5-.



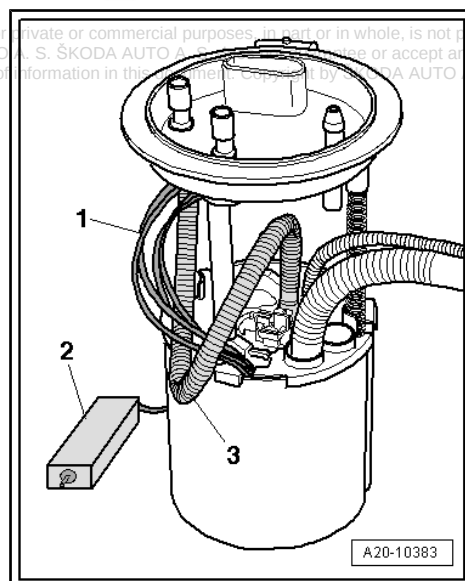
Note

Pay attention that the electrical cables -1- and the fuel feed line -3- are routed according to the illustration and the float arm -2- is not blocked.

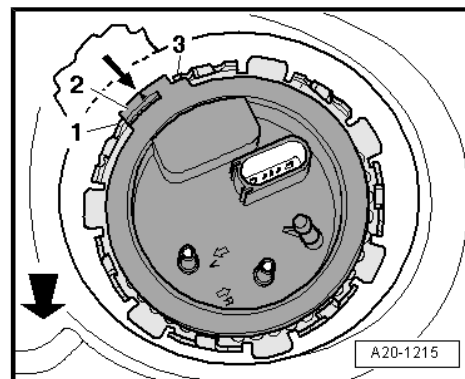
Continued for the fuel delivery unit type one and two

- Press the closing flange down and bring it into the installation position.

Further information:

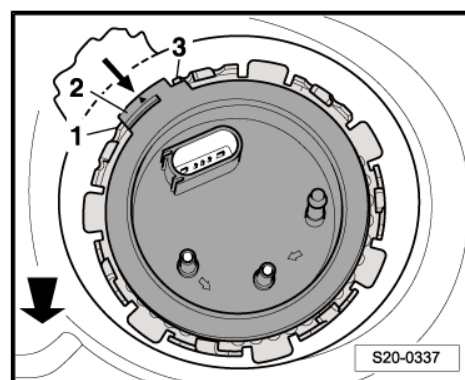


Fuel delivery unit type one



Fuel delivery unit type two

- ◆ Observe the fitting location of the fuel delivery unit. The peg -2- at the closing flange must be located between the pegs -1- and -3-. The -thick arrow- points in the direction of travel.
- ◆ Tighten the lock ring to 110 Nm.
- ◆ Do not interchange feed line and return-flow line.
- ◆ Make sure the fuel lines fit tightly.
- ◆ After installing the fuel delivery unit, check whether the feed line and the return-flow line are clipped correctly in place on the fuel tank.



1.10 Removing and installing the fuel gauge sender - G-



Note

There are two types of sender for the fuel gauge - G- installed in vehicles.

Fuel gauge sender - G- type 1

Removing

- Remove fuel delivery unit.
- ◆ Vehicles with front-wheel drive: ➔ [page 161](#)
- ◆ Vehicles with four-wheel drive: ➔ [page 162](#)

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- Unlatch and disconnect the plug connection of the lines -1- (brown), -2- (blue) and -3- (black).
- Raise securing tabs -4- and -5- with a screwdriver and remove the fuel gauge sender - - downwards -arrow-.

Installing

- Insert the fuel gauge sender - G- into the guides on the fuel delivery unit and press upwards until it engages.
- Connect the wiring and check correct installation of the plug.
- Install fuel delivery unit.

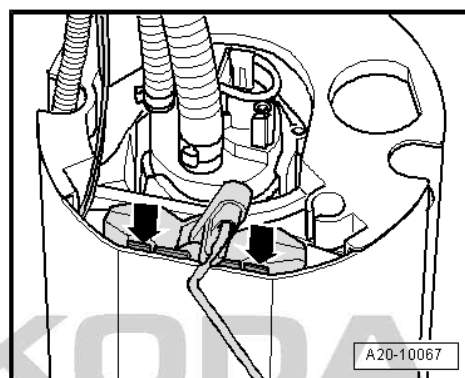
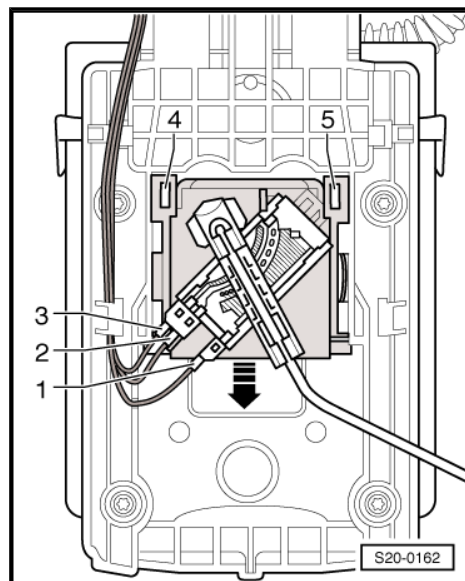
♦ Vehicles with front-wheel drive: ⇒ [page 161](#)

♦ Vehicles with four-wheel drive: ⇒ [page 162](#)

Fuel gauge sender - G- type 2

Removing

- Remove fuel delivery unit.
- ♦ Vehicles with front-wheel drive: ⇒ [page 161](#)
- ♦ Vehicles with four-wheel drive: ⇒ [page 162](#)
- Unlock the securing tabs -arrows- using a screwdriver and pull the fuel gauge sender - G- up and out.



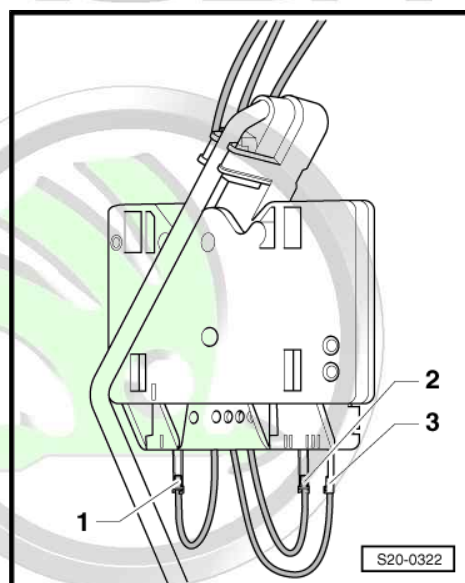
- Unlatch and disconnect the plug connection of the lines -1- (brown), -2- (blue) and -3- (black).

Installing

- Connect the wiring and check correct installation of the plug.
- Insert the fuel gauge sender - G- into the guides on the fuel delivery unit and press down until it engages.
- Install fuel delivery unit.

♦ Vehicles with front-wheel drive: ⇒ [page 161](#)

♦ Vehicles with four-wheel drive: ⇒ [page 162](#)



1.11 Removing and installing fuel gauge sender - G169- on vehicles with four-wheel drive.

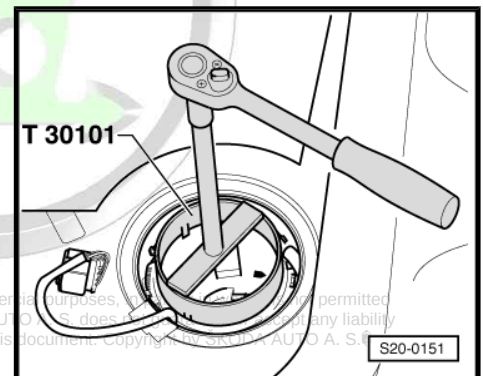
- The fuel tank must not be more than $\frac{1}{2}$ full.

Note

- ◆ Where necessary, empty the fuel tank ⇒ [page 155](#).
- ◆ Safety precautions when working on the fuel supply system ⇒ [page 3](#).
- ◆ Observe the regulations concerning cleanliness when working on the fuel supply/injection system ⇒ [page 4](#).
- ◆ Make sure that the sender for fuel gauge display is not bent.

Removing

- Switch off ignition and pull out ignition key.
- Removing rear seat bench ⇒ Body Work ⇒ Rep. gr. 72.
- Remove left cover and disconnect plug from fuel gauge sender 2 - G169-.
- Open lock ring with the wrench - T30101 -.



- Pull lightly Fuel gauge transmitter 2 - G169- out of the opening of the fuel tank, unlock the securing tabs -arrows- and disconnect the pump.

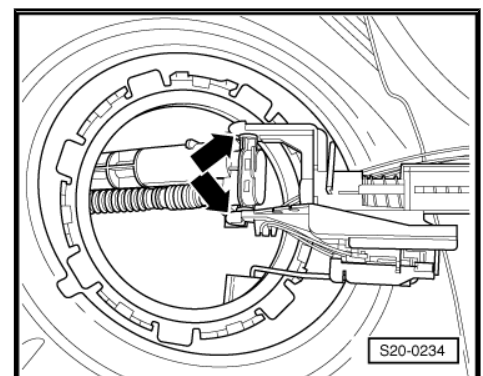
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



WARNING

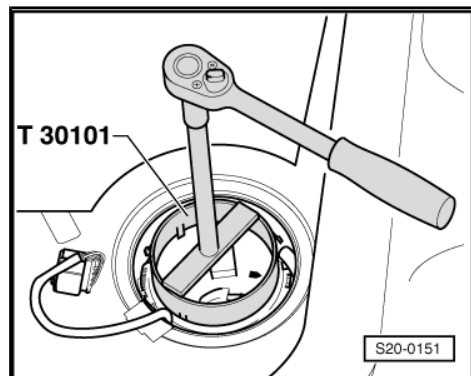
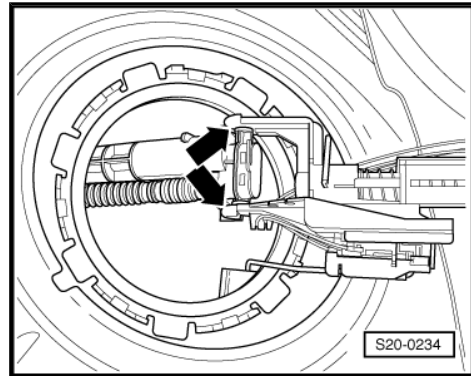
When installing do not bend the float arm of the fuel gauge sender 2 - G169-.



- Insert the fuel gauge sender 2 - G169- into the fuel tank.



- Place suction jet pump inside in the fuel tank on the fuel dispenser 2 - G169- and push to the stop until the retaining slats -arrows- engage.
- Insert new dry sealing ring for the flange into the opening of the fuel tank and only moisten the inside (towards the flange) with fuel.
- Check the fitting position ➔ [page 153](#) and insert the flange of the fuel gauge sender 2 - G169 - into the opening of the fuel tank.
- Check correct positioning of sealing ring.
- Tighten lock ring with wrench - T30101 - to 110 Nm.
- Fit on plug and install left cover.

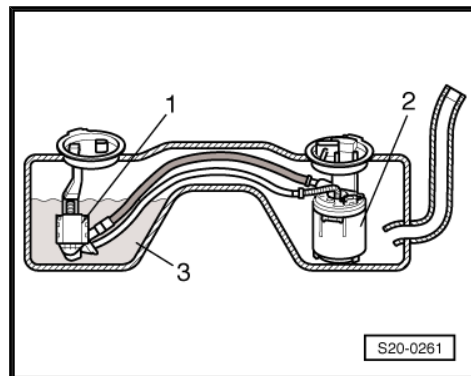


1.12 Removing and installing the suction jet pump for vehicles with four-wheel drive



Note

- ◆ On vehicles with four-wheel drive, the fuel tank consists of a left and right chamber. In order to pump the fuel out of the left chamber -3- of the fuel tank into the right chamber to the housing of the fuel delivery unit -2-, a suction jet pump -1- is required.
- ◆ The design of the fuel tank means that the fuel needs to be pumped from the area of the fuel gauge sender 2 - G169- to the fuel delivery unit using a suction jet pump.
- ◆ A check is only to be carried out, if the engine stops because of fuel shortage, although the fuel gauge still indicates a fuel tank which is $\frac{1}{4}$ full.



Work procedure

- Remove fuel delivery unit ➔ [page 161](#) .
- Remove fuel gauge sender 2 - G169- ➔ [page 169](#) .
- Now the suction jet pump can be pulled out from the side of the fuel gauge sender 2 - G169- (on left in direction of travel).
- Check if the fuel lines are firmly connected to the suction jet pump and are not damaged.
- Check the suction jet pump additionally for possible contamination.

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1.13 Removing and installing tandem pump, vehicles with engine code BKD, AZV

Special tools and workshop equipment required

- ◆ Diesel extractor , e. g. -VAS 5226-
- ◆ Pliers for spring-type clips

Removing



WARNING

The tandem pump must on no account be disassembled, otherwise the proper operation of the pump vacuum part is no longer assured. This will result in a failure of the brake booster.



Caution

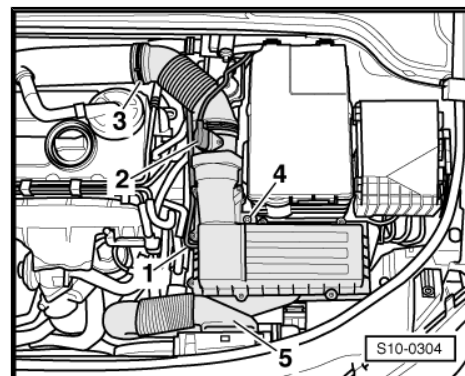
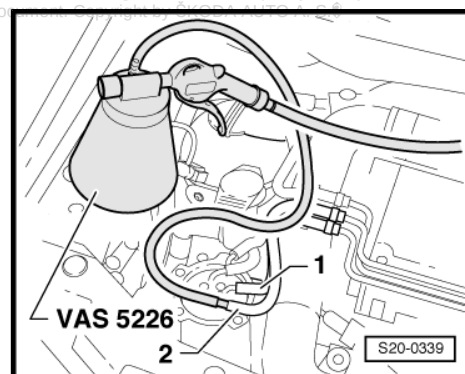
Observe instructions for re-installing a used tandem pump ⇒ [page 178](#) .



Note

- ◆ *Safety precautions when working on the fuel supply system ⇒ [page 3](#) .*
- ◆ *Observe the regulations concerning cleanliness when working on the fuel supply/injection system ⇒ [page 4](#) .*

- Remove engine cover ⇒ [page 13](#) .
- Detach the fuel intake hose -1- (marked in white) and fuel return-flow hose -2- (marked in blue) from the fuel filter.
- Connect the diesel extractor - VAS 5226- to the fuel return-flow hose -2-.
- Connect the compressed air to the diesel extractor - VAS 5226- .
- Create a vacuum with the diesel extractor - VAS 5226- until no more fuel flows out of the fuel return-flow hose.
- Unplug connector -2- from air mass meter - G70- .
- Detach bleeder hose -1-, intake hose -3- and air guide hose -5-.
- Unscrew screw -4- and remove air filter housing.





- Separate vacuum line -1- for brake servo unit from tandem pump -4-.
- Detach fuel intake hose -2- (marked in white) and fuel return-flow hose -3- (marked in blue) from the tandem pump -4-.
- Unscrew fixing screws -arrows- and remove tandem pump -4- from the cylinder head.

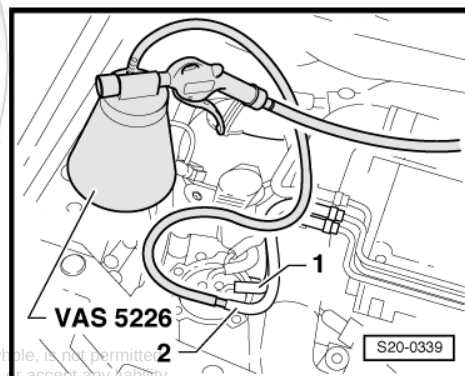
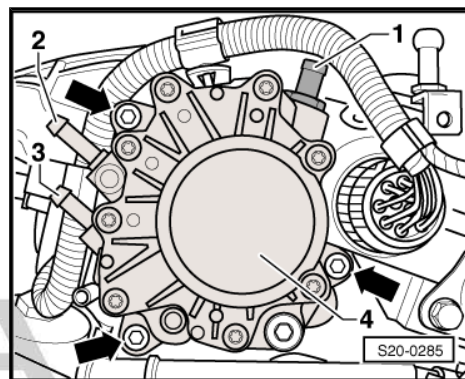
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Note

- ◆ *Ensure that the tandem pump driver is correctly seated in the camshaft.*
- ◆ *Always replace the tandem pump seals.*
- Install tandem pump and tighten the fixing screws -arrows- M8 to 20 Nm.
- Connect the fuel intake hose -1- (marked in white) to the fuel filter.
- Connect the diesel extractor - VAS 5226- to the return-flow hose -2-.
- Operate the diesel extractor - VAS 5226- until fuel comes out of the fuel return-flow hose.
- Connect fuel return-flow hose -2- (marked in blue) to fuel filter.



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1.14 Removing and installing tandem pump, vehicles with engine code BMM

Special tools and workshop equipment required

- ◆ Diesel extractor , e. g. -VAS 5226-
- ◆ Pliers for spring-type clips

Removing



WARNING

The tandem pump must on no account be disassembled, otherwise the proper operation of the pump vacuum part is no longer assured. This will result in a failure of the brake booster.



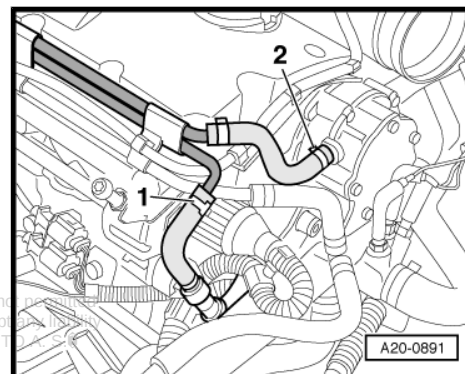
Caution

*Observe instructions for re-installing a used tandem pump
⇒ [page 178](#) .*

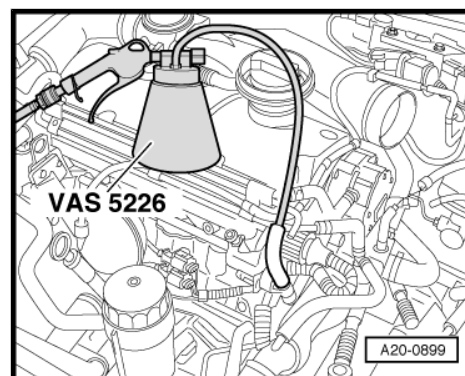
i Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ◆ *Observe the regulations concerning cleanliness when working on the fuel supply/injection system* ⇒ [page 4](#) .
- Remove engine cover ⇒ [page 13](#) .
- Remove air filter ⇒ [page 220](#) .
- Remove fuel intake hose -2- (marked in white) from the tandem pump 4.
- Remove fuel return-flow hose -1- (marked in blue) from the fuel line.

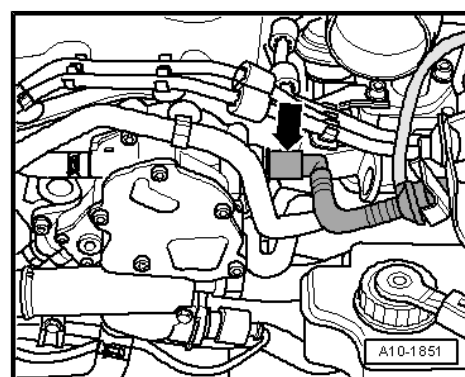
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- Connect the diesel extractor - VAS 5226- at the fuel return-flow hose.
- Connect the compressed air to the diesel extractor - VAS 5226- .
- Create a vacuum with the diesel extractor - VAS 5226- until no more fuel flows out of the fuel return-flow hose.



- Disconnect the vacuum hose to the brake servo unit on the tandem pump -arrow-,
- Pull out the central plug for the unit injectors.





- Unscrew screws -arrows-.
- Remove tandem pump -4- from cylinder head.

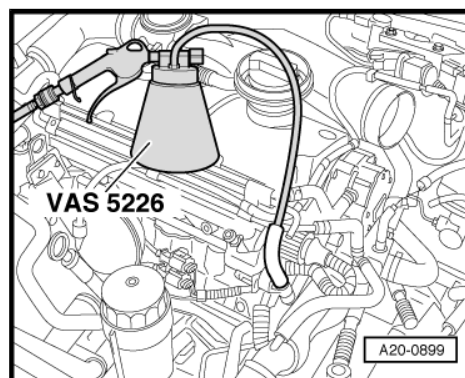
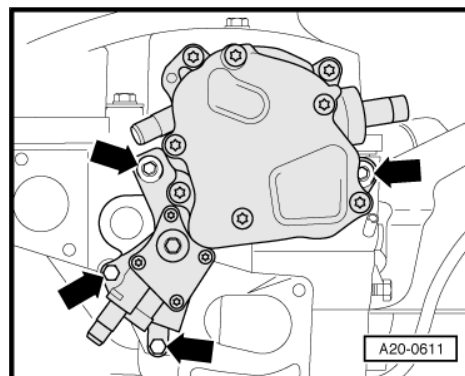
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Note

- ◆ *Ensure that the tandem pump driver is correctly seated in the camshaft.*
- ◆ *Always replace the tandem pump seals.*
- Install tandem pump and tighten the top fixing screws (M8) to 20 Nm.
- Tighten bottom fixing screws (M6) to 8 Nm.
- Connect fuel intake hose and vacuum hose to tandem pump.
- Connect the diesel extractor - VAS 5226- at the fuel return-flow hose.
- Operate the diesel extractor - VAS 5226- until fuel comes out of the fuel return-flow hose.
- Connect fuel return-flow hose (marked in blue) to the fuel line.
- Connect central plug for unit injectors.



1.15 Inspecting a tandem pump

1.15.1 Checking the feed pressure of the tandem pump, vehicles with engine code BKD, AZV

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Special tools and workshop equipment required

- ◆ Tester for tandem pump e.g. -VAS 5187- with hollow screw - VAS 5187/1A-
- ◆ Hose clamp - MP 7-602 (3094)-
- ◆ Pliers for spring-type clips

Test conditions

- The coolant temperature must be at least 85 °C.
- Unit injectors O.K.
- Fuel filter and fuel line must not be blocked.

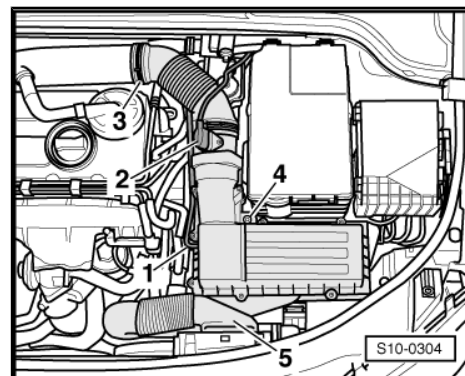
Work procedure



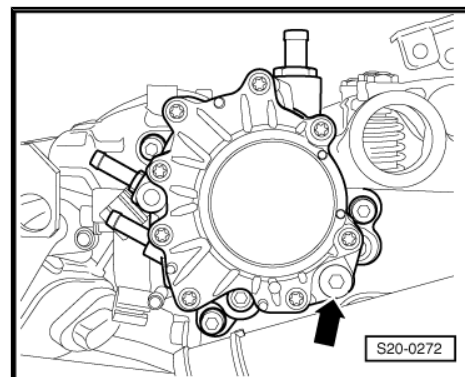
Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe the regulations concerning cleanliness when working on the fuel supply/injection system* ⇒ [page 4](#).
- Remove engine cover ⇒ [page 13](#).
- Unplug connector -2- from air mass meter - G70-.
- Detach bleeder hose -1-, intake hose -3- and air guide hose -5-.
- Unscrew screw -4- and remove air filter housing.

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- Release screw plug -arrow-.





- Connect tester for tandem pump - VAS 5187 - with hollow screw -VAS 5187/1A- as shown.
- Install air filter and intake hose and air guide hose.
- Connect air mass meter - G70- .
- Start engine and increase engine speed to 4000 rpm.
- Observe displayed pressure on the tester for tandem pump .
- Specified value: at least 1,05 MPa (10,5 bar).

If the measurement is less than the specification:

- Clamp fuel return-flow line between tandem pump and fuel filter with hose clamp - MP 7-602 - .
- Start engine and increase engine speed to 4000 rpm.
- Observe displayed pressure on the tester for tandem pump .
- Specified value: min. 1.05 MPa (10.5 bar).

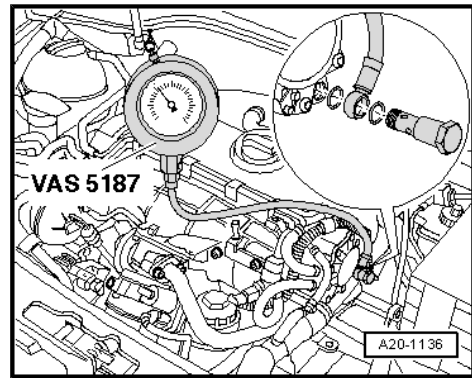
If the specified value is reached:

Pressure loss at the unit injectors.

- Replace O-rings for unit injectors ➔ [page 215](#) .

If the measurement is less than the specification:

- Replace tandem pump ➔ [page 171](#) .



Note

After removing the tester for tandem pump , tighten the screw plug to 25 Nm. Always replace the gasket ring.

1.15.2 Checking the feed pressure of the tandem pump, vehicles with engine code BMM

Special tools and workshop equipment required

- ◆ Tester for tandem pump e.g. -VAS 5187- with hollow screw - VAS 5187/1A-
- ◆ Hose clamp - MP 7-602 (3094)-
- ◆ Pliers for spring-type clips

Test conditions

- The coolant temperature must be at least 85 °C.
- Unit injectors O.K.
- Fuel filter and fuel line must not be blocked.

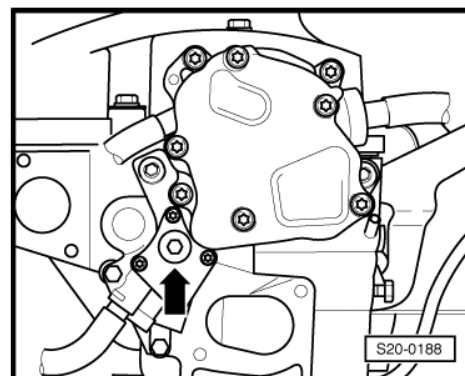
Work procedure



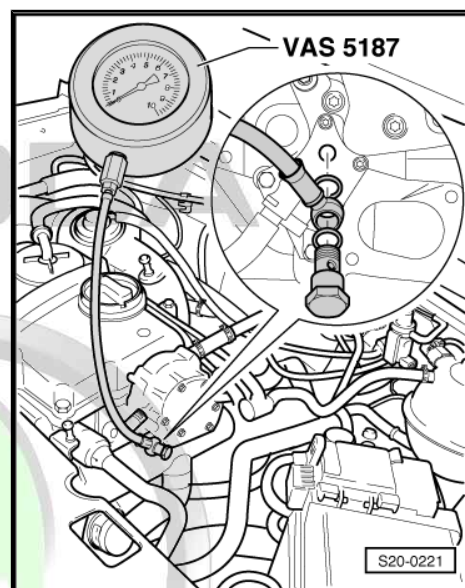
Note

- ◆ *Safety precautions when working on the fuel supply system*
➔ [page 3](#) .
- ◆ *Observe the regulations concerning cleanliness when working on the fuel supply/injection system* ➔ [page 4](#) .
- Remove engine cover ➔ [page 13](#) .

- Remove air filter ⇒ [page 220](#) .
- Release screw plug -arrow-.



- Connect tester for tandem pump - VAS 5187 - with hollow screw -VAS 5187/1A- as shown.
- Install air filter and intake hose and air guide hose.
- Connect air mass meter - G70- .
- Start engine and run in idle.
- Observe displayed pressure on the tester for tandem pump .
 - Specified value: at least 0,35 MPa (3,5 bar).
- Increase engine speed to 4000 rpm.
- Observe displayed pressure on the tester for tandem pump .
 - Specified value: at least 0,75 MPa (7,5 bar).



If the measurement is less than the specification:

- Clamp fuel return-flow line between tandem pump and fuel filter with hose clamp - MP 7-602 - .
- Observe displayed pressure on the tester for tandem pump .
 - Specified value: at least 0,75 MPa (7,5 bar).

If the specified value is reached:

Pressure loss at the unit injectors.

- Replace O-rings for unit injectors ⇒ [page 225](#) .

If the measurement is less than the specification:

- Replace tandem pump ⇒ [page 172](#) .

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Note

After removing the tester for tandem pump , tighten the screw plug to 25 Nm. Always replace the gasket ring.



1.15.3 Check tightness (internally) of tandem pump



Note

After re-installing a used tandem pump e.g. after changing or repairing a cylinder head and/or after changing a hopper motor the tandem pump must absolutely be checked for internal tightness between fuel and oil side. In case of leakage this can lead to a fuel/oil mixing, which can cause an engine damage.

Special tools and workshop equipment required

- ◆ Tester , e.g. -V.A.G 1687-

Work procedure

- Disconnect the fuel intake hose (white marking) and the fuel return-flow hose (blue marking) from the tandem pump.
- Close fuel return-flow connection at tandem pump with a dummy plug. Secure the dummy plug with a spring strap clamp.

Prepare tester - V.A.G 1687- as follows:

- Unscrew pressure control valve -2- fully and close the valves -3- and -4-.
- Connect the testing device -5- with a commercially available connection for compressed air and a piece of fuel hose to the connection of the fuel feed line for the tandem pump. Secure hose with spring strap clip.



Note

The rotary knob must be pulled to the top in order to rotate the pressure control valve -2-.

- Connect the pneumatic hose -1- (pneumatic support) at tester.



Note

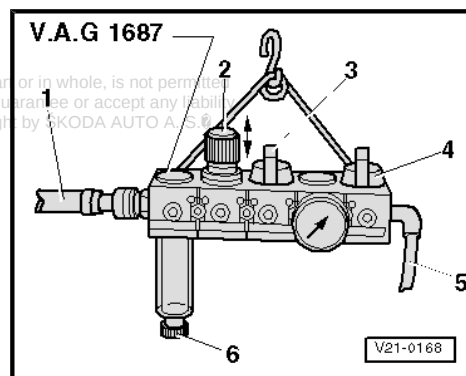
If there is water in the transparent drain container, drain water via the drain plug -6-.

- Open valve -3-.
- Set the pressure to 0,1 MPa (1,0 bar) with the pressure control valve -2-.



WARNING

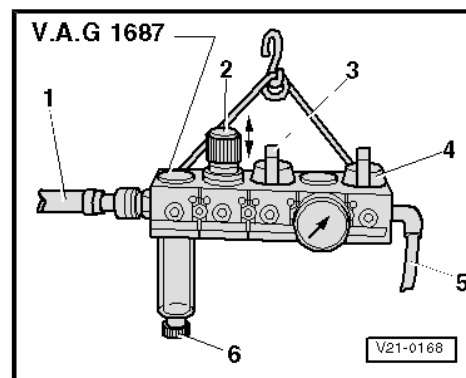
The maximum test pressure is 0.13 MPa (1.3 bar) and it must not be exceeded.



- Open valve -4- and wait until the test circuit is filled. If necessary, re-adjust the pressure to 0.1 MPa (1.0 bar).
- Close valve -3- to hold pressure and observe the pressure drop for 1 min.

If the pressure does not drop, the tandem pump can be used again.

If the pressure drops, the tandem pump must be replaced.



1.16 inspecting fuel pump

Special tools and workshop equipment required

- ◆ Remote control , e.g. -V.A.G 1348/3A -
- ◆ Auxiliary measuring set, , e. g. -V.A.G 1594 C -
- ◆ Adapter e.g. -V.A.G 1318/16 -
- ◆ Adapter e.g. -V.A.G 1318/17 -
- ◆ Measuring glass



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Checking the function and supply voltage

Test conditions

- Battery voltage at least 11.5 V
- Fuses OK (No. 27).
- All electrical consumers such as the lights and rear window heater must be switched off.

Test sequence

- Removing rear seat bench ⇒ Body Work ⇒ Rep. gr. 72 .
- Remove the cover from the fuel delivery unit.
- Switch on ignition.
- The fuel pump must be heard to start running.
- Switch off ignition.

If the fuel pump does not run:

- Continuing searching for faults using a multimeter ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Check fuel flow rate

Test conditions

- Battery voltage at least 11.5 V
- Fuel temperature 15-30 °C.
- Fuel tank at least 1/4 full.

Test sequence



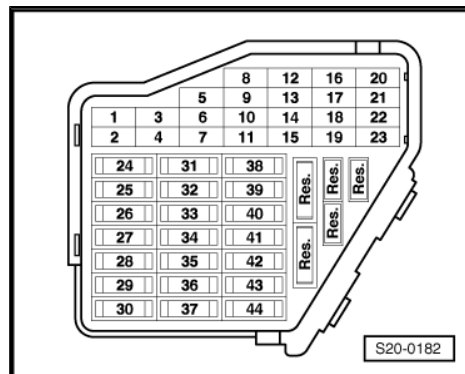
Note

- ♦ *Safety precautions when working on the fuel supply system ⇒ [page 3](#) .*
- ♦ *Observe the regulations concerning cleanliness when working on the fuel supply/injection system ⇒ [page 4](#) .*
- Switch off ignition and pull out ignition key.
- Unscrew the cap from the filler neck.
- Removing rear seat bench ⇒ Body Work ⇒ Rep. gr. 72 .
- Unclip retaining catches -arrows- of cover for the fuel delivery unit and remove cover.

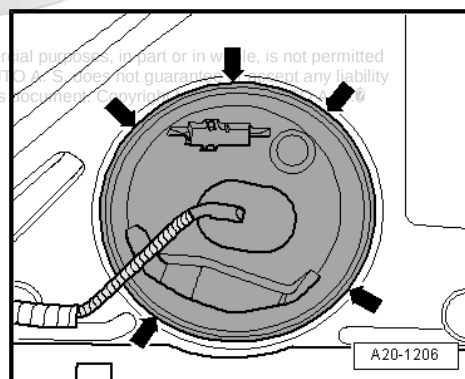
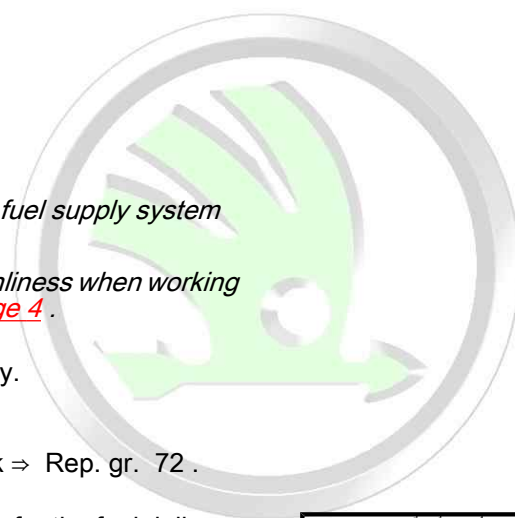


Note

On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.



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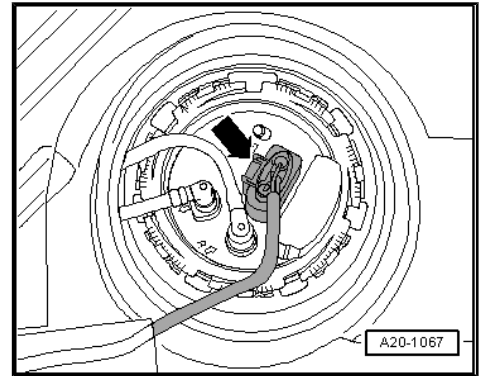


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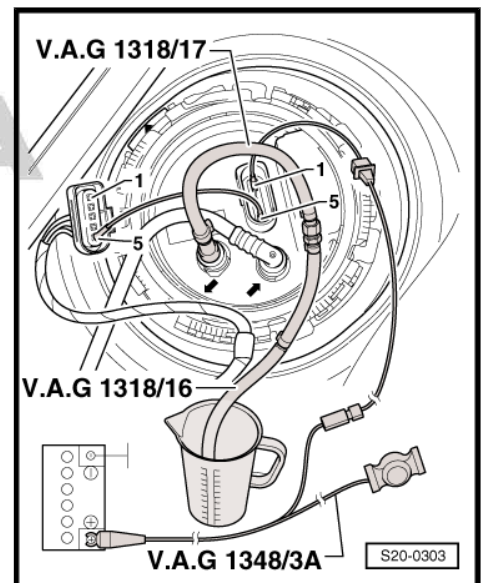
- Unplug connector -arrow-.

i Note

On vehicles with four-wheel drive, the position of the plugs and the fuel lines is different.



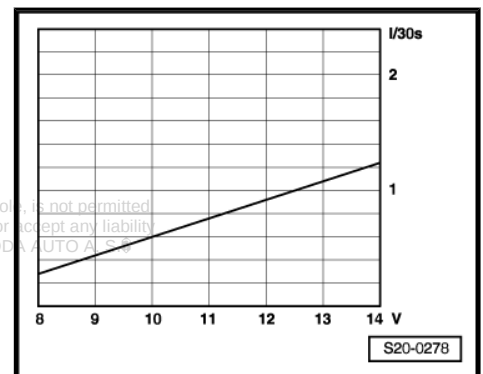
- Connect remote control - V.A.G 1348/3A- with connection lines from measuring tool set to contact -1- of the fuel pump and to battery positive terminal.
- Use the connection lines from the measuring tool set to connect the contacts -5- to the plug and to the fuel delivery unit.
- Pull off the fuel feed line from the flange of the fuel delivery unit.
- Connect adapter - V.A.G 1318/17- and adapter - V.A.G 1318/16- , fit onto the feed support and hold in a measuring glass.
- Activate the remote control - V.A.G 1348/3A- for 30 seconds.
- Measure the battery voltage.



- Compare the fuel rate with the specified value.

i Note

- ◆ *The amount of the fuel pumped is dependent on the voltage.*
- ◆ *The diagram refers to the voltage which exists at the fuel pump.*
- ◆ *The voltage at the fuel pump is about 2 volts less than the battery voltage.*



If the minimum fuel delivery volume is not reached:

- Remove the fuel delivery unit and check that the preliminary stage screen is not clogged up.

If no fault was detected until now:

- Replace fuel delivery unit.



2 Accelerator control

2.1 Assembly overview - accelerator module

1 - Connector

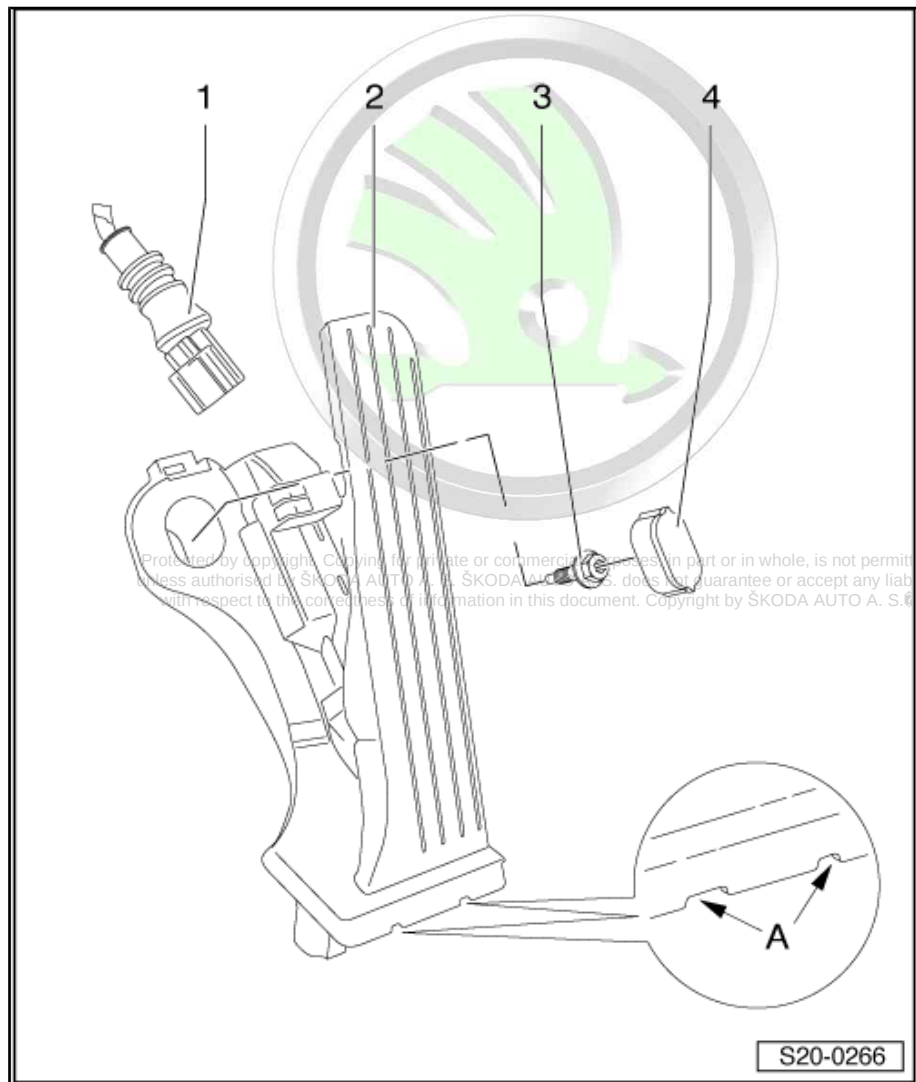
- ☐ black
- ☐ 6-pin

2 - Accelerator pedal module

- ☐ with accelerator pedal position encoder - G79- and accelerator pedal position encoder 2 - G185-
- ☐ for vehicles with automatic gearbox with kick-down switch
- ☐ not adjustable
- ☐ -A- openings for release tool - T10238- or - T10240-
- ☐ Removing and installing
⇒ [page 182](#)
- ☐ When replacing, adapt the engine control unit
⇒ Vehicle diagnostic tester

3 - 10 Nm

4 - Cap



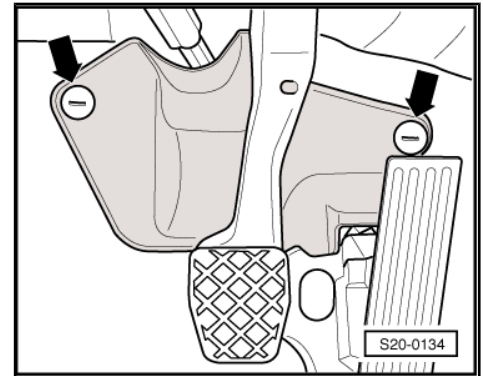
2.2 Removing and installing accelerator pedal module

Special tools and workshop equipment required

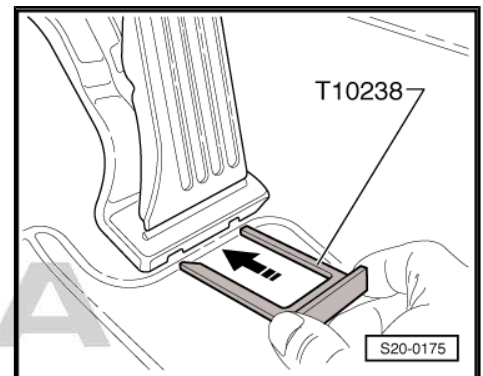
- ◆ Release tool - T10238- (for left-hand drive vehicle)
- ◆ Release tool - T10240- (for right-hand drive vehicle)

Removing

- Remove steering column trim panel -arrows-.
- Lever out the cap (➤ [page 182](#) Pos. 4) with a screwdriver.
- Unscrew fixing screw (➤ [page 182](#) , Pos. 3).

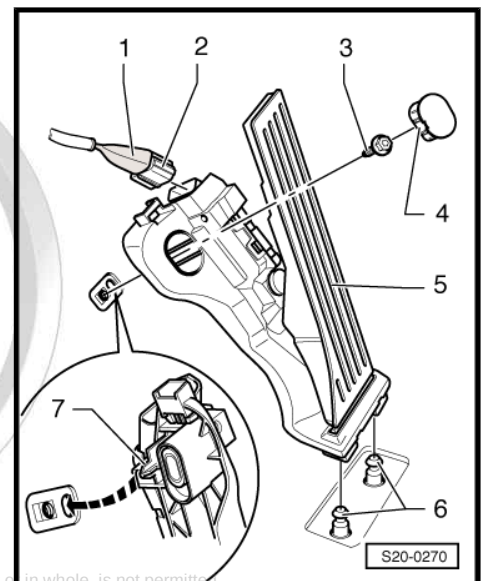


- Push the release tool - T10238- (for right-hand drive release tool - T10240-) as shown up to the stop into the provided openings and remove the accelerator pedal module.
- Disconnect connector from accelerator pedal module. To do so press down securing element from connector.



Installing

- Fit the plug -2- onto the accelerator pedal module -5-.
- The locking of the connector must be audible.
- Push accelerator pedal module onto the securing bolt -6-.
- Insert the centering pin -7- into the hole in the underbody.
- Screw the accelerator pedal module with the fixing screw -3-, tighten to 10 Nm and fit on the cap -4-.
- Install steering column cover.
- If the accelerator pedal module was replaced, the engine control unit has to be adapted ➤ Vehicle diagnostic tester.
- On vehicles with automatic gearbox, adapt the kick-down function after replacing the accelerator pedal module ➤ Vehicle diagnostic tester.



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21 – Turbocharging/supercharging

1 Charge-air system with exhaust gas turbocharger - Part 1



Note

- ♦ Observe rules for cleanliness ⇒ [page 4](#).
- ♦ Secure all hose connections with corresponding hose clips.
- ♦ The charge-air system must be tight.
- ♦ Replace the gaskets, the sealing rings and the self-locking nuts.

1.1 Connection diagram for vacuum hoses for engines with code BKD, AZV

1 - Mechanical exhaust gas recirculation valve

2 - Vacuum unit

3 - To vacuum setting element of charge pressure control

4 - To vacuum setting element of radiator for exhaust gas recirculation

5 - Valve block

- Component parts of the valve block are:

- ♦ Change-over valve for radiator of exhaust gas recirculation - N345-
- ♦ Exhaust gas recirculation valve - N18-
- ♦ Solenoid valve for charge pressure control - N75-

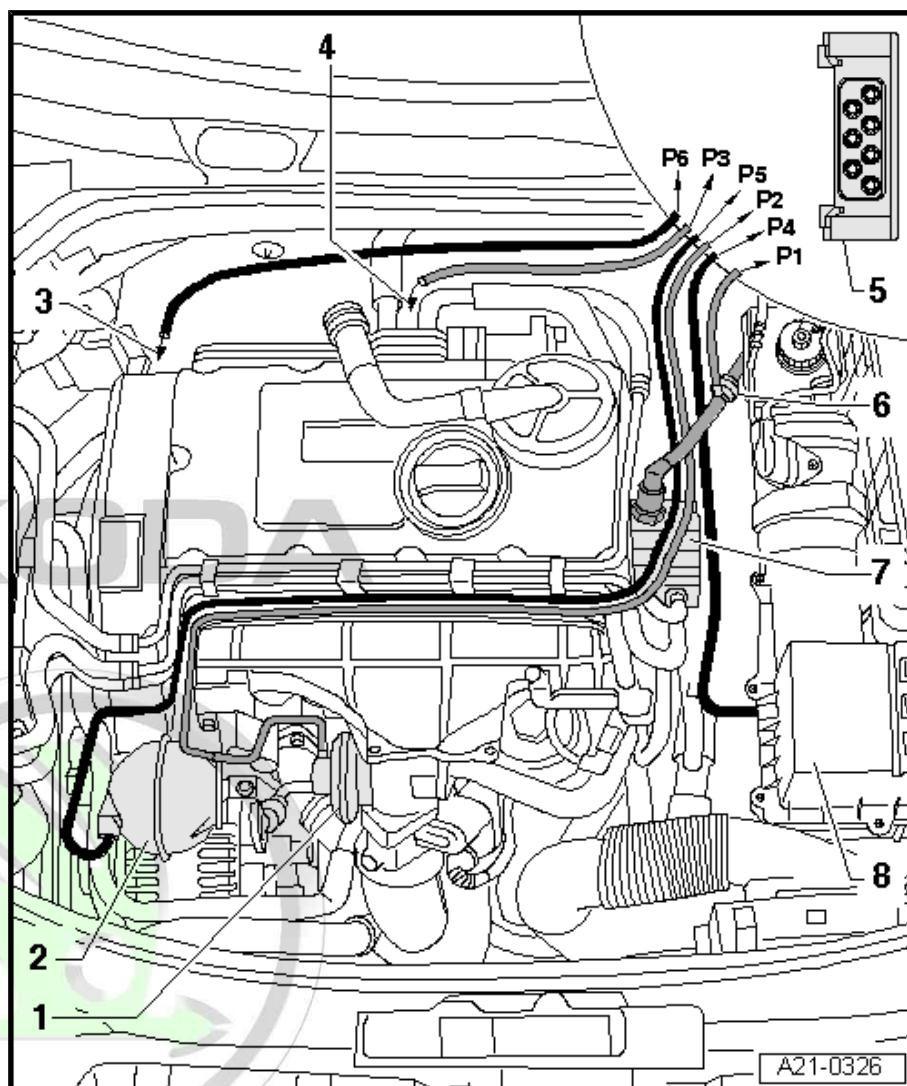
- Connection diagram ⇒ [page 185](#)

6 - Vacuum line

- from the tandem pump to the valve block

7 - Tandem pump

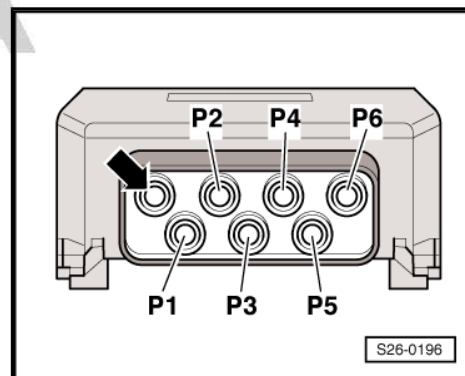
8 - Air filter



1.2 Connection diagram for valve block and vacuum sockets for engines with code BKD, AZV

Connection diagram for valve block

- P1 - Vacuum line from the tandem pump
- P2 - To mechanical exhaust gas recirculation valve
- P3 - To vacuum setting element of radiator for exhaust gas recirculation
- P4 - Ventilation hose to the air filter
- P5 - To vacuum reservoir
- P6 - To vacuum setting element of charge pressure control



Note

The vacuum connection marked with -arrow- is not used and it is closed.

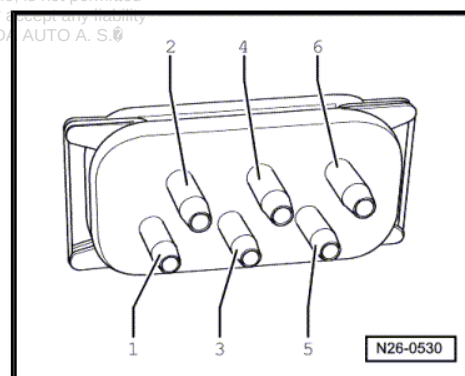
Connection diagram for vacuum sockets



Note

The side for the hose connection is shown in the fig.

- 1 - Vacuum line from the tandem pump
- 2 - To mechanical exhaust gas recirculation valve
- 3 - To vacuum setting element of radiator for exhaust gas recirculation
- 4 - Ventilation hose to the air filter
- 5 - To vacuum reservoir
- 6 - To vacuum setting element of charge pressure control



1.3 Checking the vacuum actuator and tension rods for charge pressure regulation for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Hand vacuum pump , e.g. -VAS 6213-

Faults at tension rods or at vacuum setting element of charge pressure control lead to the following faults:

- ◆ Specified values for charge pressure are not reached.
- ◆ Poor performance.
- ◆ Irregular performance in the partial load region.
- ◆ Engine jerk in change-over.

Test sequence

- Check vacuum piping for tightness and completeness
⇒ [page 184](#) .
- Charge-air system was checked for tightness ⇒ [page 199](#) .



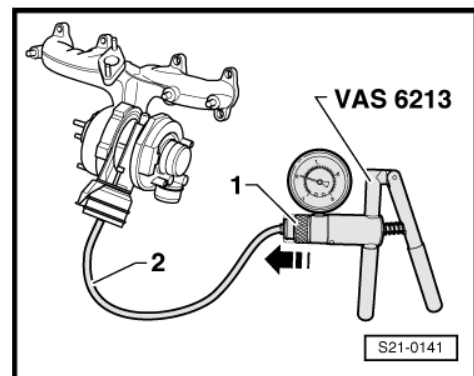
- Remove engine cover ➔ [page 13](#) .
- Connect the connecting hose -2- to the vacuum setting element and to the hand vacuum pump - VAS 6213- .
- Slide the sliding ring -1- of the hand vacuum pump - VAS 6213- in the -direction of arrow- for "vacuum".



Note

For the following test a second mechanic is required.

- Generate vacuum with the hand vacuum pump - VAS 6213- and observe the tension rod of exhaust turbocharger.



Note

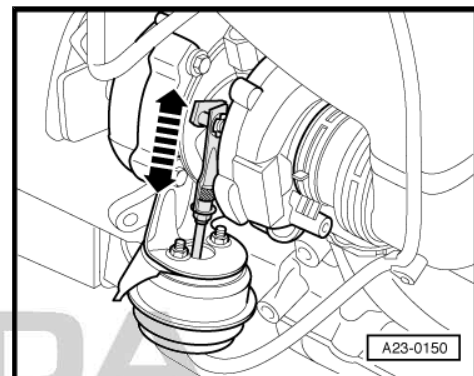
For the inspection use a mirror.

Nominal values:

- At a vacuum of 0.05...0.120 bar (0.005...0.012 MPa), the tension rod must move upwards.
- At a vacuum of 0.550...0.620 bar (0.055...0.062 MPa), the tension rod must rest at the top against the stop.
- Remove the connecting hose from the hand vacuum pump - VAS 6213- and at the same time observe the tension rod over the entire adjustment range.
- The tension rod must move without jolting over the entire adjustment range.

If the specified values are not achieved or the tension rod moves with jolt:

- Replace exhaust turbocharger ➔ [page 188](#) .



Note

- ♦ *If the measuring accuracy of the vacuum at the hand vacuum pump - VAS 6213- is not adequate, a turbocharger tester e.g. -V.A.G 1397 A- can be used for a more accurate measurement.*
- ♦ *Connection of the turbocharger tester ➔ Owner's Manual .*

1.4 Connection diagram for vacuum hoses for engines with code BUD

1 - Exhaust gas turbocharger

2 - Charge air cooler

3 - intake hose

4 - Non-return valve

5 - Brake servo

6 - Solenoid valve for charge pressure control - N75 -

7 - Air filter

8 - Changeover valve for radiator of exhaust gas recirculation - N345-

9 - Tandem pump

10 - Cylinder head

11 - Intake manifold

12 - Vacuum unit

13 - Exhaust pipe

14 - Vacuum setting element

- ☐ the radiator flap for exhaust gas recirculation
- ☐ always replace together with radiator for exhaust gas recirculation

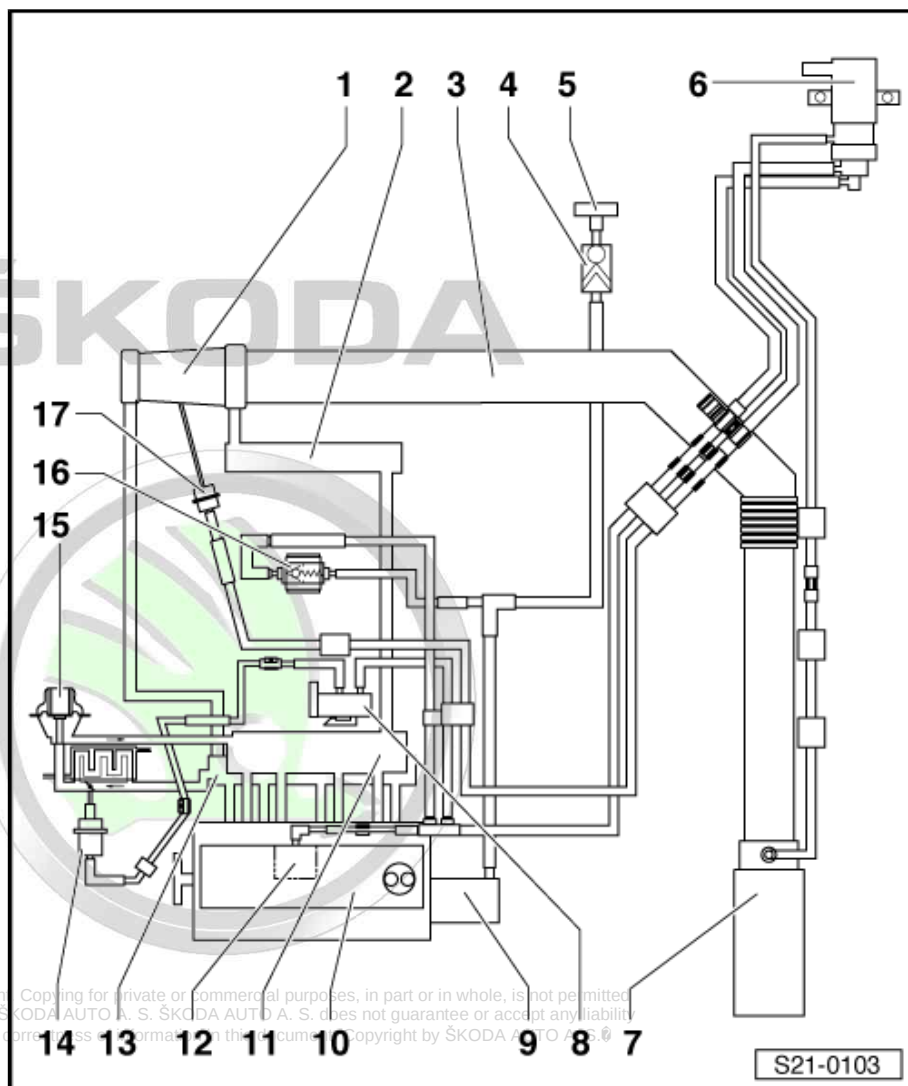
15 - Electric exhaust gas recirculation valve - N18- with EGR potentiometer - G212- and EGR control motor - V338-

16 - Non-return valve

- ☐ white connection to charge pressure control solenoid valve (Pos. 6) and to vacuum reservoir

17 - Vacuum setting element

- ☐ for charge pressure control
- ☐ Component part of the exhaust turbocharger, not replaced separately





2 Charge-air system with exhaust gas turbocharger - Part 2

2.1 Removing and installing exhaust gas turbochargers for engines with code BKD, AZV

1 - Gasket

- ☐ replace

2 - to flap of radiator for exhaust gas recirculation

3 - 25 Nm

- ☐ replace
- ☐ Coat stud bolts with hot bolt paste - G 052 112 A3-

4 - Connecting pipe

- ☐ to flap of radiator for exhaust gas recirculation

5 - Mounting bracket

- ☐ for oil feed line

6 - 10 Nm

7 - Oil feed line

- ☐ Check oil feed line for continuity before installing.
- ☐ Fill the exhaust turbocharger with engine oil through the connection fitting of the oil feed line before installing

8 - Union nut - 22 Nm

9 - Connecting piece - 30 Nm

10 - Sealing ring

- ☐ replace

11 - Gasket

- ☐ replace
- ☐ Check fitting position

12 - Exhaust gas turbocharger

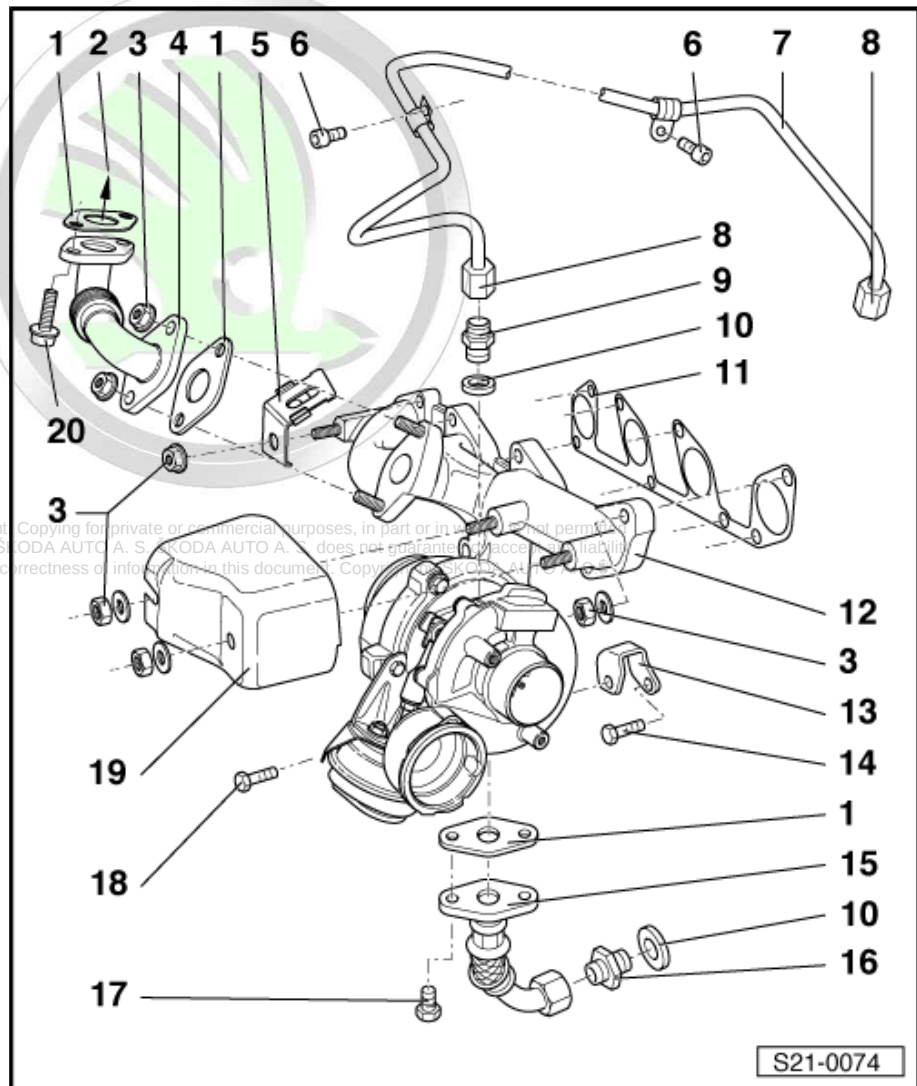
- ☐ can only be replaced complete with exhaust manifold and vacuum setting element of charge pressure control
- ☐ Removing ⇒ [page 189](#)
- ☐ installing ⇒ [page 191](#)
- ☐ Check vacuum actuator ⇒ [page 185](#)

13 - Countersupport

- ☐ between turbocharger and the cylinder block

14 - 40 Nm

- ☐ first tighten all screws by hand



15 - Oil return-flow line

- ☐ in the cylinder block

16 - Connecting piece - 40 Nm

17 - 17 Nm

18 - 20 Nm

- ☐ first tighten all screws by hand

19 - Heat shield

20 - 22 Nm

Special tools and workshop equipment required

- ◆ Pliers for spring-type clips



Caution

In case of mechanical damage to the exhaust gas turbocharger, e.g. damage of the compressor wheel, it is not sufficient to only replace the exhaust gas turbocharger. In order to prevent consequential damage to the engine, perform the following tasks:

- ◆ ***Clean all oil lines.***
- ◆ ***Change engine oil and oil filter.***
- ◆ ***Check air filter housing, air filter element and charge air pipes as well as charge air hoses for soiling.***
- ◆ ***Check all the air guides and the charge air cooler for foreign bodies.***

If foreign bodies are detected in the charge air system, the complete charge-air routing must be cleaned and if necessary the charge air cooler must also be replaced.

Removing

- Remove engine cover ⇒ [page 13](#) .
- Remove the cooling water tank cover ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove bulkhead plenum chamber -arrows-.
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Remove bottom part of right wheelhouse liner ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove right drive shaft ⇒ Chassis ⇒ Rep. gr. 40 .

Vehicles with auxiliary heating

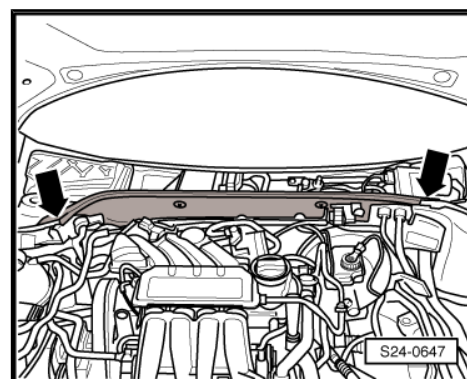
- Unscrew screws for coolant pipes for auxiliary heating and push off pipes to the left.

Continued for all vehicles



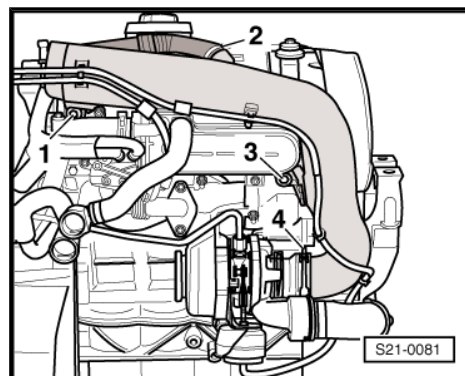
Note

The illustration shows the removed engine in rear view.

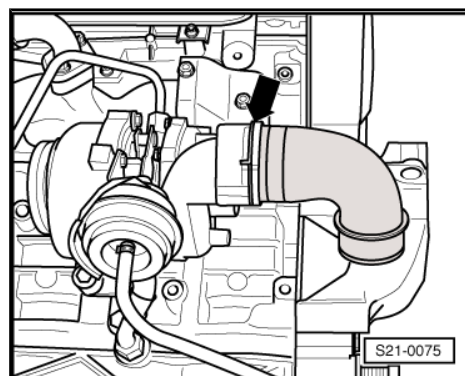




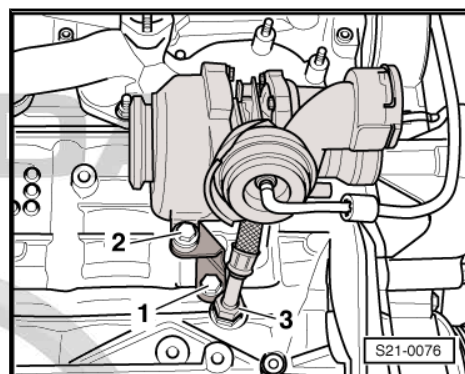
- Remove screws -1- and -3-.
- Unlock the vacuum lines at the rear of the charge air pipe and disconnect the hose to the vacuum actuator of the charge boost pressure control.
- Disconnect the hose -2- to the crankcase ventilation hose from the charge air pipe.
- Release the spring strap clamp -4- with pliers for spring strap clamps and remove the charge air pipe from the exhaust gas turbocharger.



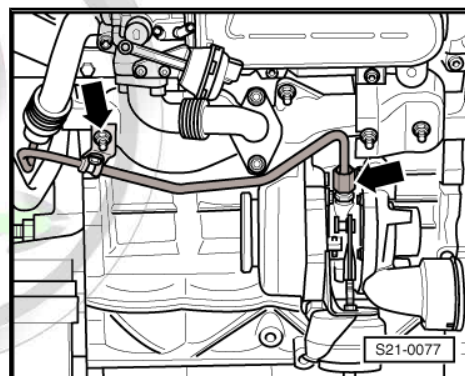
- Unscrew the fixing screws securing the charge air tube and remove the connecting hose from the exhaust gas turbocharger; to do so, lift the retaining clip slightly -arrow-.
- Remove pre-exhaust pipe ➔ [page 229](#) .



- Unscrew screws -1- and -2- and remove the turbocharger support.
- Remove the oil return line -3- from the cylinder block.

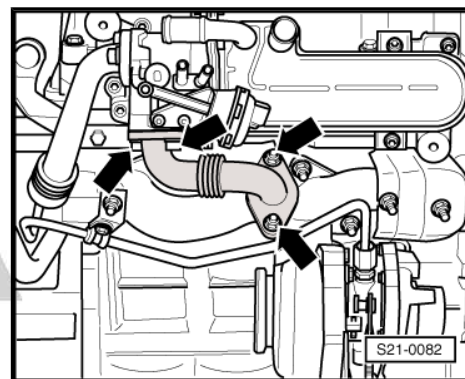


- Unscrew the oil feed line from the exhaust gas turbocharger and exhaust manifold -arrows- and unscrew it from the coolant tube and the oil filter holder and place it aside.



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- Remove the connection pipe for exhaust gas recirculation -arrows- and heat shield for exhaust manifold.



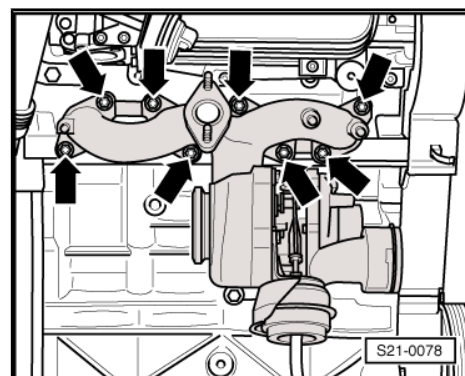
- Unscrew nuts -arrows- and remove exhaust manifold with exhaust turbocharger downwards.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

Note

- ◆ Replace the gaskets, the sealing rings and the self-locking nuts.
- ◆ Fill exhaust turbocharger with engine oil through the connection fitting of the oil feed line.
- ◆ Hose connections and hoses for the charge air system must be free of oil and grease before being installed.
- ◆ Secure all hose connections with corresponding hose clips.
- Install pre-exhaust pipe ➔ [page 229](#) .
- Align exhaust system free of stress ➔ [page 239](#) .
- Observe the assembly instruction for hose connections with push-fit couplings ➔ [page 198](#) .
- Checking the oil level ➔ Maintenance ; Booklet Octavia II .



Note

To ensure the oil supply to the exhaust gas turbocharger, leave the engine running for about 1 minute after installing the exhaust gas turbocharger.

2.2 Removing and installing charge air cooling parts for engines with code BKD, AZV

Note

- ◆ Before testing or repairing, check all hoses and lines for tight connection and leaks.
- ◆ Hose connections and hoses for the charge air system must be free of oil and grease before being installed.
- ◆ Secure all hose connections with corresponding hose clips.



1 - 7 Nm

2 - Mounting bracket

- ☐ Check fitting position

3 - Charge air cooler

- ☐ Removing and installing
⇒ [page 197](#)

4 - top seal

- ☐ fitted onto charge air cooler

5 - bottom seal

- ☐ fitted onto charge air cooler

6 - Connecting hose

7 - to exhaust gas turbocharger

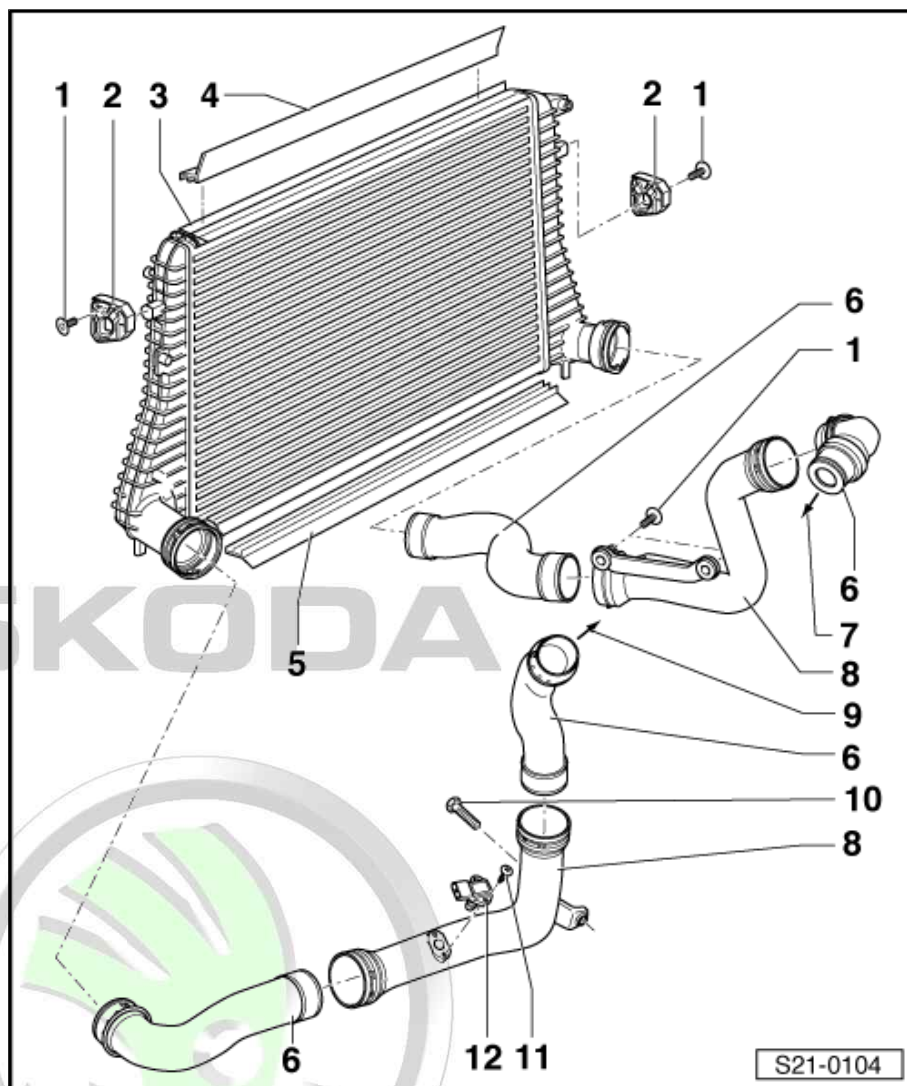
8 - Charge air pipe

9 - to inlet connection

10 - 15 Nm

11 - 3 Nm

12 - Charge pressure sender -
G31- / intake air temperature
sender - G42-



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2.3 Removing and installing the exhaust gas turbocharger for engines with code BMM

1 - 10 Nm

2 - Mounting bracket

3 - Heat shield

4 - Oil supply hose

- ☐ to connection fitting of oil feed line for exhaust turbocharger
- ☐ Check oil feed line for continuity before installing.
- ☐ Fill the exhaust turbocharger with engine oil through the connection fitting of the oil feed line before installing

5 - Vacuum setting element

- ☐ for charge pressure control
- ☐ Component part of the exhaust turbocharger, not replaced separately

6 - Vacuum hose

7 - Gasket

- ☐ replace
- ☐ Check fitting position

8 - for diesel particle filter

9 - Warm-type clamp - 7 Nm

- ☐ for exhaust gas turbocharger and diesel particle filter
- ☐ replace

10 - Exhaust turbocharger with exhaust manifold

- ☐ can only be replaced as one part
- ☐ Removing and installing ⇒ [page 194](#)

11 - 25 Nm

- ☐ replace

12 - 25 Nm

13 - Gasket

- ☐ replace

14 - Connecting pipe

- ☐ for exhaust gas recirculation

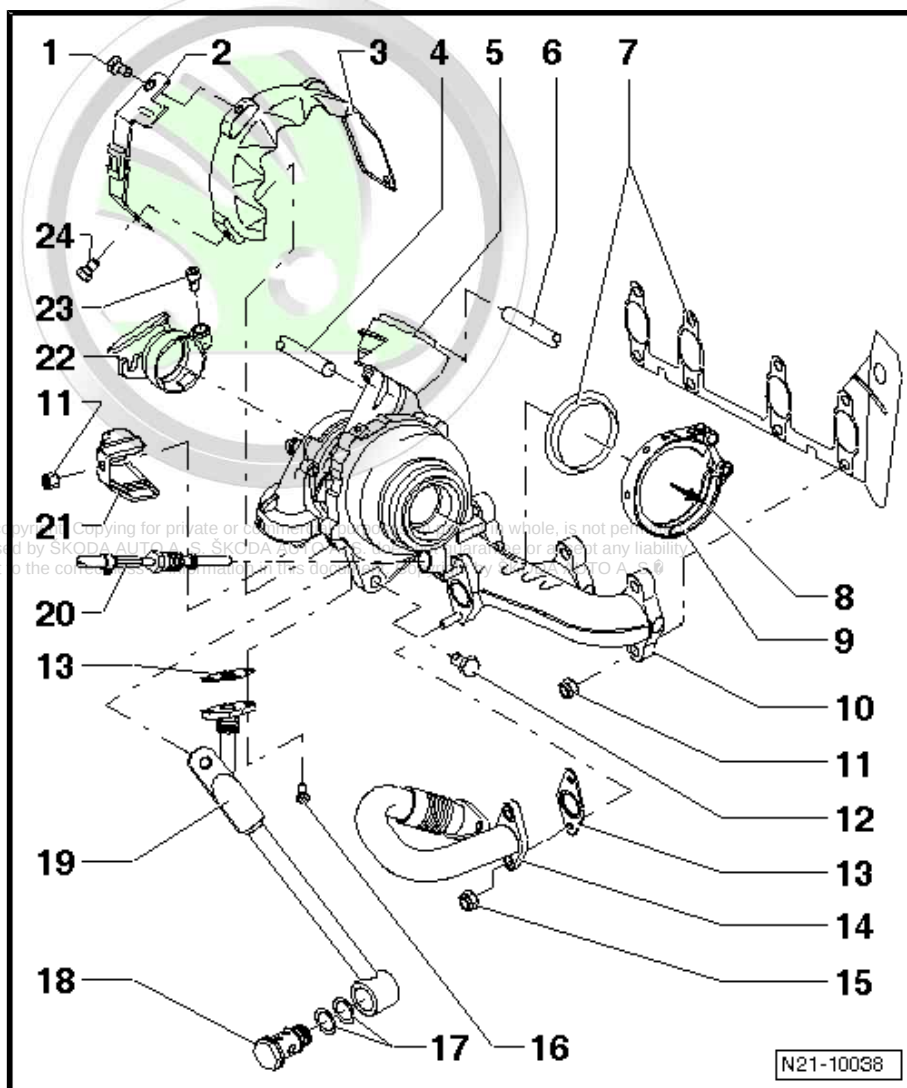
15 - 25 Nm

- ☐ replace

16 - 15 Nm

17 - O-ring

- ☐ replace





18 - Hollow screw - 60 Nm

19 - Countersupport

- ☐ for exhaust gas turbocharger
- ☐ for oil return-flow line

20 - Exhaust gas temperature sender 1 - G235- (Temperature sender upstream of turbocharger - G507-)

- ☐ 45 Nm
- ☐ the thread of new temperature transmitters must be coated with assembly paste
- ☐ Grease only the thread with hot bolt paste - G 052 112 A3- for re-used temperature sender.

21 - Heat shield

22 - Supports

- ☐ for intake hose on exhaust gas turbocharger

23 - 9 Nm

24 - 10 Nm

Special tools and workshop equipment required

- ◆ Set of tools SW 17 - T10395-
- ◆ Pliers for spring-type clips



Caution

In case of mechanical damage to the exhaust gas turbocharger, e.g. damage of the compressor wheel, it is not sufficient to only replace the exhaust gas turbocharger. In order to prevent consequential damage to the engine, perform the following tasks:

- ◆ *Clean all oil lines.*
- ◆ *Change engine oil and oil filter.*
- ◆ *Check air filter housing, air filter element and charge air pipes as well as charge air hoses for soiling.*
- ◆ *Check all the air guides and the charge air cooler for foreign bodies.*

If foreign bodies are detected in the charge air system, the complete charge-air routing must be cleaned and if necessary the charge air cooler must also be replaced.

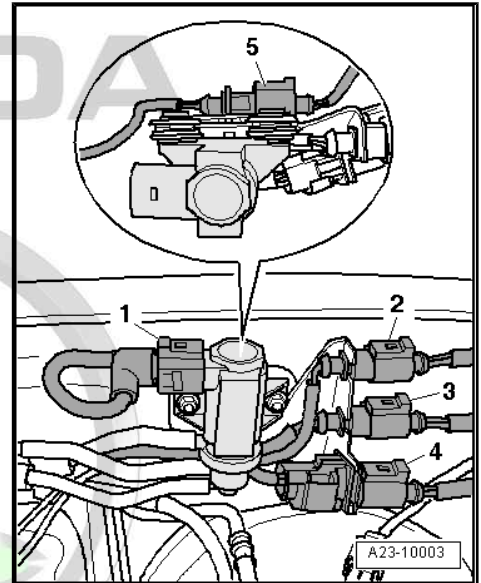
Removing

- Switch off ignition and pull out ignition key.

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- Disconnect plug connection -5- for exhaust gas temperature sender 1 - G235- (temperature sender upstream turbocharger - G507-) and expose cable.
- Remove pre-exhaust pipe with diesel particle filter
⇒ [page 234](#) .
- Unplug connector on air mass meter - G70- ⇒ [page 216](#) .
- Remove connecting pipe and intake hose ⇒ [page 220](#) .
- Remove connecting piece for intake hose on exhaust gas turbocharger ⇒ [page 193](#) .
- Remove vacuum line to vacuum actuator (Pos. 5).
- Remove oil supply hose (Pos. 4).
- Remove right drive shaft ⇒ Chassis ⇒ Rep. gr. 40 .
- Detach the connecting hose from the turbocharger
⇒ [page 196](#) .
- Remove the connecting pipe for the exhaust gas recirculation
⇒ [page 247](#) .
- Exhaust gas temperature sender 1 - G235- (temperature sender upstream from turbocharger - G507-) -arrow- using a wrench from set of tools SW 17 - T10395- .



Vehicles with auxiliary heating

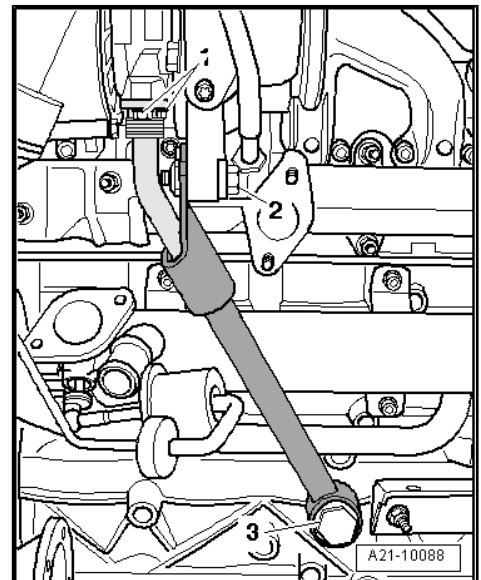
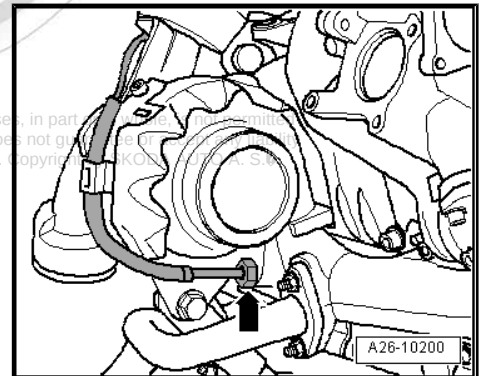
- Unscrew screws for coolant pipes for auxiliary heating and push off pipes to the left.

Vehicles with four-wheel drive

- Remove the right flange shaft of the angle gearbox ⇒ Gearbox
⇒ Rep. gr. 39 .

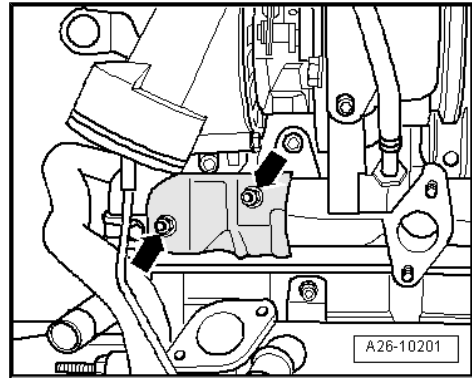
Continued for all vehicles

- Unscrew screw -2- and hollow screw -3-.
- Rotate the turbocharger support 90° and pull it down and out of the oil return line.





- Remove left heat shield at exhaust manifold -arrows-.
- Unscrew holder for diesel particle filter.



- Unscrew nuts -arrows- and remove exhaust manifold with exhaust turbocharger downwards.

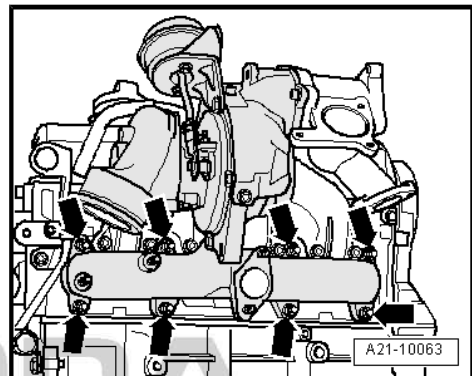
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Note

- ◆ Replace the gaskets, the sealing rings and the self-locking nuts.
- ◆ Fill exhaust turbocharger with engine oil through the connection fitting of the oil feed line.
- ◆ Hose connections and hoses for the charge air system must be free of oil and grease before being installed.
- ◆ Secure all hose connections with corresponding hose clips.
- Observe the assembly instruction for hose connections with push-fit couplings ⇒ [page 198](#) .
- Checking the oil level ⇒ Maintenance ; Booklet Octavia II .



Note

To ensure the oil supply to the exhaust gas turbocharger, leave the engine running for about 1 minute after installing the exhaust gas turbocharger.

2.4 Removing and installing charge air cooling parts for engines with code BMM

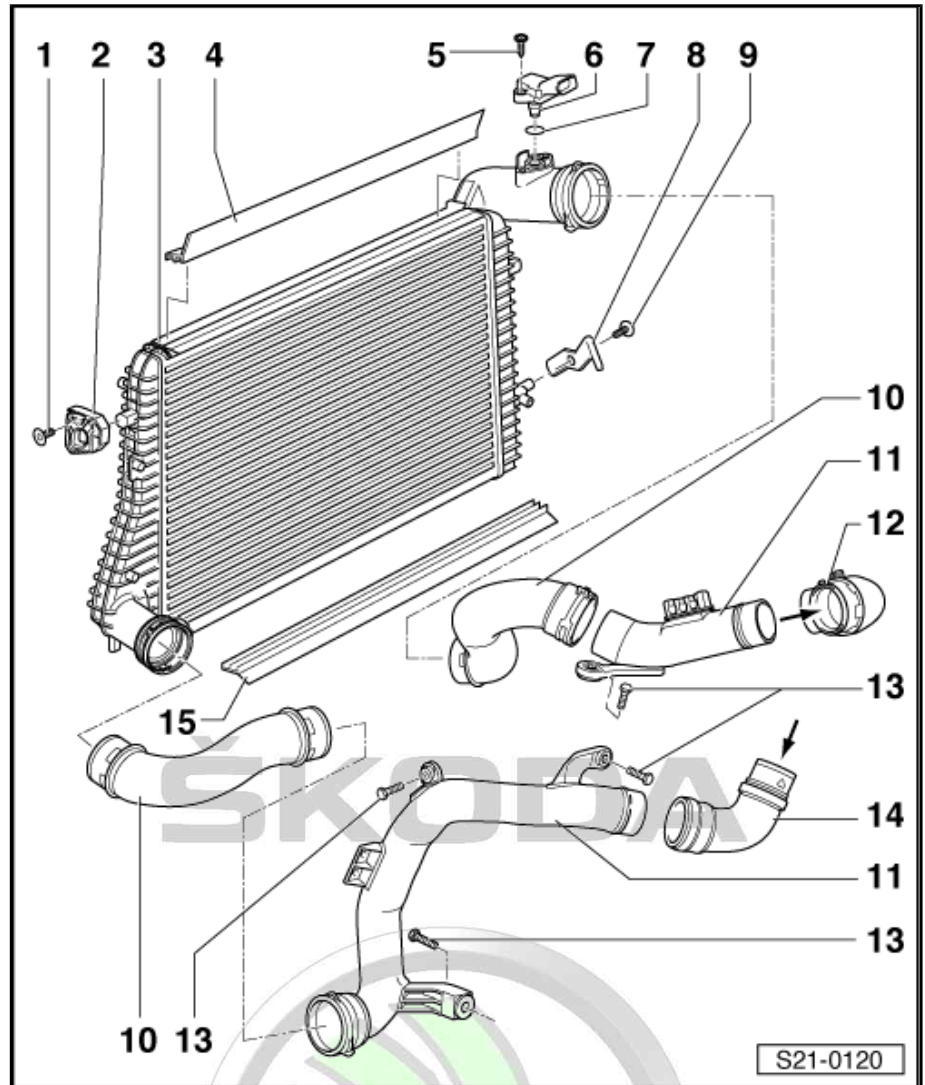


Note

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- ◆ Before testing or repairing, check all hoses and lines for tight connection and leaks.
- ◆ Hose connections and hoses for the charge air system must be free of oil and grease before being installed.
- ◆ Secure all hose connections with corresponding hose clips.

- 1 - 5 Nm
- 2 - Mounting bracket
 - ☐ Check fitting position
- 3 - Charge air cooler
 - ☐ Removing and installing
⇒ [page 197](#)
- 4 - top seal
 - ☐ fitted onto charge air cooler
- 5 - 3 Nm
- 6 - Charge pressure sender - G31- / intake air temperature sender - G42-
- 7 - O-ring
 - ☐ Replace if damaged.
- 8 - Mounting bracket
- 9 - 5 Nm
- 10 - Connecting hose
- 11 - Charge air pipe
- 12 - Connecting hose
 - ☐ to intake manifold flap motor - V157-
- 13 - 8 Nm
- 14 - Connecting hose
 - ☐ from exhaust turbo-charger
- 15 - bottom seal
 - ☐ fitted onto charge air cooler



2.5 Removing and installing charge air cooler

Removing

- Remove coolant radiator.
- ◆ Motor code BKD, AZV: ⇒ [page 138](#)
- ◆ Engine code BMM: ⇒ [page 146](#)
- Remove front bumper ⇒ Body Work ⇒ Rep. gr. 63
- If not already done, disconnect connecting hoses from charge air cooler.
- Remove screws for charge air cooler holder.
- ◆ Vehicles with engine code BKD, AZV: ⇒ [page 191](#) , Pos. 1
- ◆ Vehicles with engine code BMM: ⇒ [page 196](#) , Pos. 1

**WARNING**

Do not open the refrigerant circuit of the air conditioning system.

**Caution**

To avoid causing damage to the condenser and to the refrigerant lines and hoses make sure the lines and hoses are not over-extended, kinked or bent.

**Note**

For the following operations a second mechanic is required to hold the charge air cooler.

- Swivel the charge air cooler towards the rear, remove the lateral bearings and unhook out of the lower bearings.
- Release the securing bolts -arrows- of the condenser.
- Remove charge air cooler downwards.

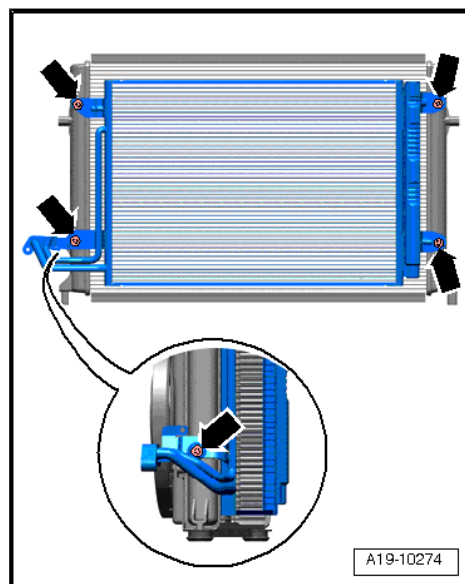
Installing

Installation occurs in reverse order to removal. Pay attention to the following:

**Note**

Replace O-rings.

- Observe the assembly instruction for hose connections with push-fit couplings ⇒ [page 198](#) .



2.6 Hose connections with quick couplings

**Caution**

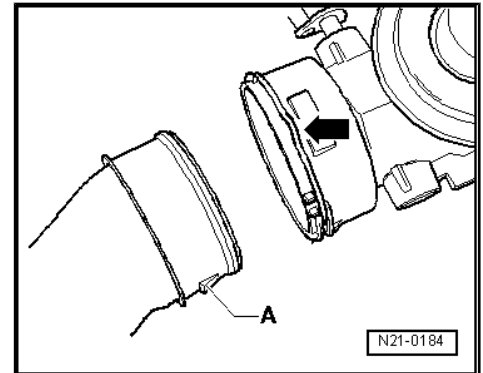
The gasket ring for the push-fit coupling can be damaged, if the locking clip is in the lock position during the assembly. The connection would leak. Observe the assembly instruction.

Removing

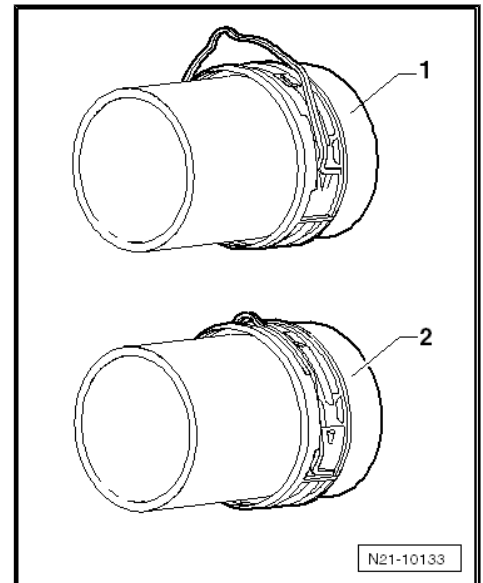
- Release push-fit coupling by pulling the locking clip -arrow-. Disconnect hose/pipe without auxiliary tool.

Installing

- When replacing the sealing ring, place the sealing ring in the groove of the charge air hose. Make sure that the gasket ring is fully seated all around in the groove and not twisted.
- Oil the sealing surface and the sealing ring.



- Put the securing clamp into the release position -1-.
- Insert the charge air hose up to the stop into the coupling.
- Put the locking clip into the lock position -2- and then press down once again the charge air hose.
- Check hose for tight connection by pulling on it and check the quick coupling is locked correctly.



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2.7 Checking the charge-air system for leak-tightness

Special tools and workshop equipment required

- ◆ Charge-air system testing device , e. g. -V.A.G 1687-
- ◆ Adapter e.g. -V.A.G 1687/10-

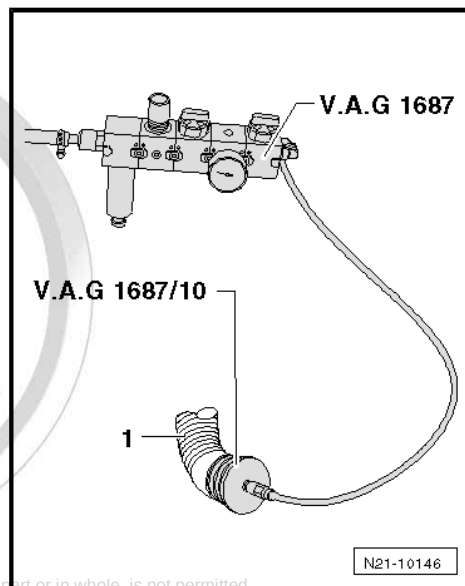
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Test sequence

- Remove intake hose -1- from air filter.
- Fit adapter - 1687/10- into the intake hose -1- and secure with a clamp.

Prepare tester for charge air system - V.A.G 1687- as follows:

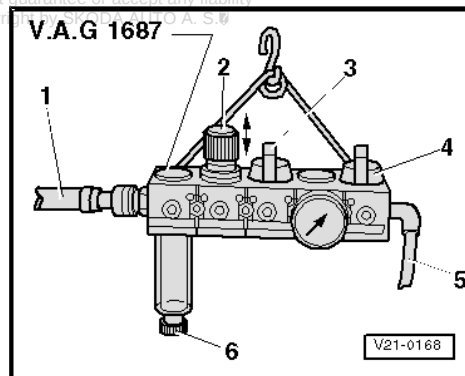


- Unscrew pressure control valve -2- fully and close the valves -3- and -4-.

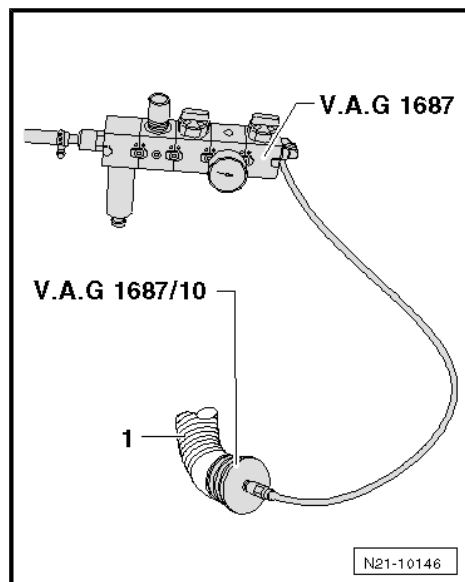


Note

The rotary knob must be pulled to the top in order to rotate the pressure control valve -2-.



- Connect tester - V.A.G 1687- as shown to adapter - 1687/10 -.



- Connect the pneumatic hose -1- (pneumatic support) at tester.

i Note

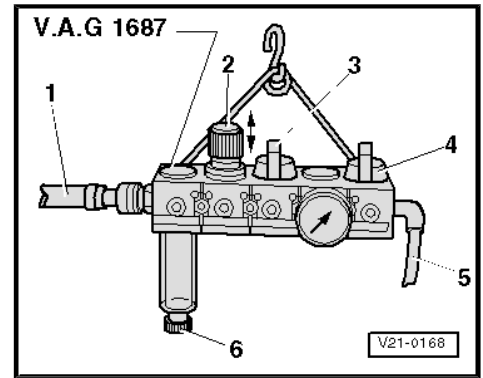
If there is water in the transparent drain container, drain water via the drain plug -6-.

- Open valve -3-.
- Set the pressure to 0.05 MPa (0.5 bar) with the pressure control valve -2-.



Caution

The pressure must not be greater than 0.05 MPa (0.5 bar)! A too high pressure can damage the engine.



- Open valve -4- and wait until the test circuit is filled. If necessary, re-adjust the pressure to 0.05 MPa (0.5 bar).
- Listen to, touch or use commercially available leak search spray or the ultrasonic measuring device e. g. -V.A.G 1842- to check the charge-air system with exhaust gas turbocharger for leak points.

i Note

- ♦ *Minor leaks are permissible on the suction side of the turbo-charger, because the intake hoses are not designed for over-pressure.*
- ♦ *A small amount of air escapes via the valves into the engine. For this reason no pressure test is possible.*
- ♦ *Using the ultrasonic tester - V.A.G 1842- ➔ Owner's Manual .*
- ♦ *In case of a leak point, observe the instructions for charge air system ➔ [page 5](#) during the installation.*

- ♦ *Before removing the adapter, depressurize the test circuit by detaching the coupling from the adapter -1687/10-.*

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23 – Mixture preparation - injection

1 Repairing Diesel Direct Injection system

The control unit is equipped with event memory. Before repairs, setting operations and fault finding, query the event memory and run self-diagnosis ⇒ Vehicle diagnostic tester.



Note

- ◆ *Faults can be detected by the control unit as checking and adjustment work is being undertaken and then saved. It is therefore essential to always delete the event memory after completing all checking and adjustment work ⇒ Vehicle diagnostic tester.*
- ◆ *Safety precautions when working on the diesel direct injection system ⇒ [page 3](#).*

1.1 Installation locations for engines with code BKD, AZV - overview



Note

- ◆ *Some components are mounted under the engine cover.*
- ◆ *Remove engine cover ⇒ [page 13](#).*

The components A through G are not represented in the overview figure.

ŠKODA



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A - Warning light for engine electronics - K149-

- ☐ in the dash panel insert

B - Accelerator pedal position sender - G79- with accelerator pedal position sender 2 - G185-

- ☐ in footwell on the accelerator pedal

C - The brake light switch - F- and brake pedal switch - F63-

- ☐ in footwell on the brake pedal

D - Fuel pump relay - J17-

- ☐ on relay carrier

E - Clutch position sender - G476-

- ☐ at master cylinder

F - 6-way relay carrier

- ☐ with automatic glow period control unit - J179-
- ☐ below E-box in the engine compartment

G - Relay and fuse carrier

- ☐ with terminal 30 voltage supply relay - J317-
- ☐ with terminal 15 voltage supply relay - J329-
- ☐ E-box in the engine compartment

1 - Unit injectors and glow plugs

- ☐ Valve for pump nozzle of cylinder 1 - N240-
- ☐ Valve for pump nozzle of cylinder 2 - N241-
- ☐ Valve for pump nozzle of cylinder 3 - N242-
- ☐ Valve for pump nozzle of cylinder 4 - N243-
- ☐ Removing and installing unit injectors ⇒ [page 210](#)
- ☐ Glow plug 1 - Q10-
- ☐ Glow plug 2 - Q11-
- ☐ Glow plug 3 - Q12-
- ☐ Glow plug 4 - Q13-
- ☐ Removing and installing glow plugs ⇒ [page 250](#)

2 - Diesel direct injection system control unit - J248-

- ☐ with altitude sender - F96-
- ☐ Removing and installing ⇒ [page 227](#)

3 - Radiator flap for exhaust gas recirculation

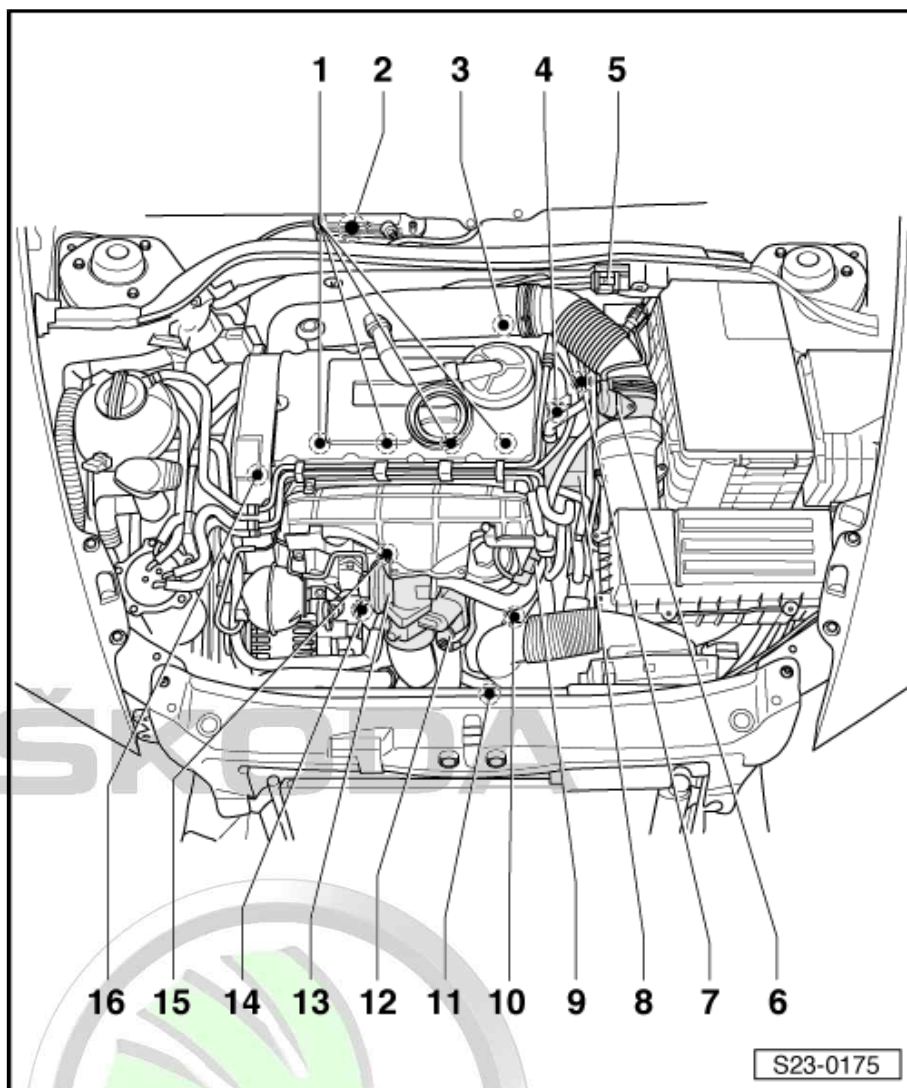
4 - Multipin plug connection

- ☐ for the wiring harness for unit injectors and glow plugs

5 - Valve block

- ☐ Component parts of the valve block are:

- ◆ Change-over valve for radiator of exhaust gas recirculation - N345-





- ◆ Exhaust gas recirculation valve - N18-
- ◆ Solenoid valve for charge pressure control - N75-
- 6 - Air mass meter - G70-
- 7 - Coolant temperature sender - G62-
- 8 - Tandem pump
- 9 - Fuel temperature sender - G81-
- 10 - engine speed sender - G28 -
 - Removing and installing ⇒ [page 226](#)
- 11 - Charge pressure sender - G31- with intake air temperature sender - G42-
- 12 - Intake manifold flap motor - V157-
- 13 - Mechanical exhaust gas recirculation valve
- 14 - Coolant temperature sender at radiator outlet - G83-
- 15 - 3-pin connector
 - Hall sender - G40-
- 16 - Hall sender - G40-
 - for camshaft position



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1.2 Intake manifold - summary of components for engines with code BKD, AZV

1 - Intake manifold

2 - 22 Nm

3 - Shackle

4 - Gasket

☐ replace

5 - 22 Nm

6 - Mounting bracket

☐ for wiring loom

7 - from radiator for exhaust
gas recirculation

8 - 10 Nm

9 - Connecting pipe

☐ for exhaust gas recirculation

10 - Gasket

☐ replace

11 - Intake manifold flap motor
- V157-

☐ The intake manifold flap is closed for about 3 seconds after switching off the engine and then opens again. This reduces the switch-off impact.

12 - O-ring

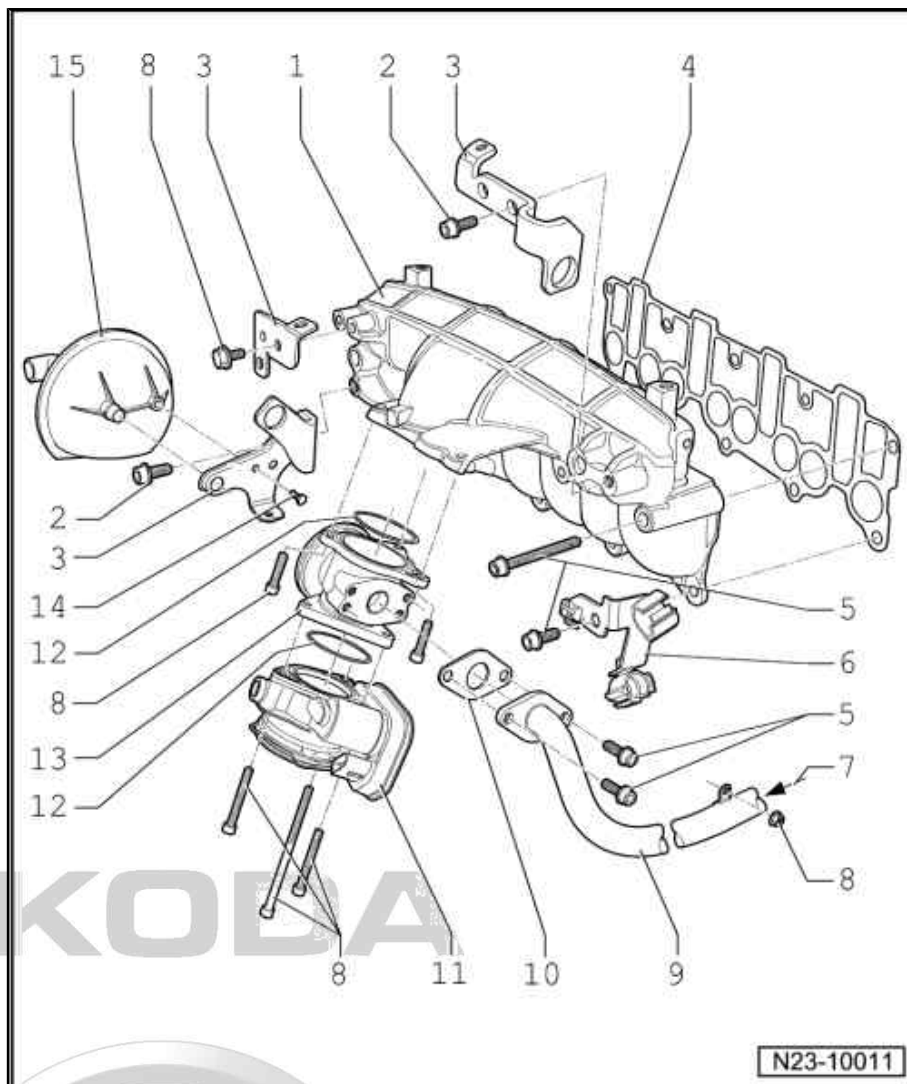
☐ replace

13 - Mechanical exhaust gas
recirculation valve

☐ with vacuum actuator

14 - 3 Nm

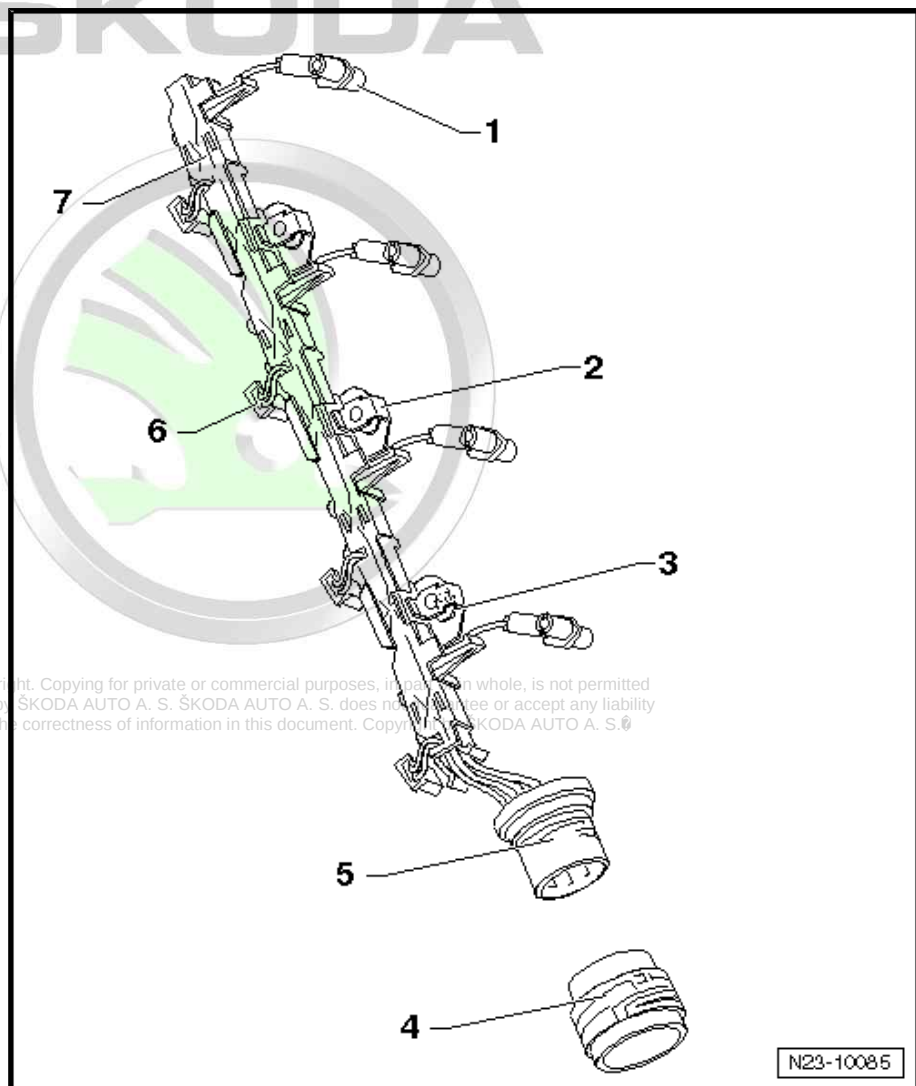
15 - Vacuum unit





1.3 Wiring harness for unit injectors and glow plugs - summary of components for engines with code BKD, AZV

- 1 - Glow plug connectors
- 2 - Stainless steel clamps
 - ☐ do not bend
- 3 - Fixing screw
 - ☐ tighten to 10 Nm
- 4 - Reduction Ring
 - ☐ note the correct installation position when installing ➔ [page 206](#)
- 5 - Central plug connection
 - ☐ note the correct installation position when installing ➔ [page 206](#)
- 6 - Connector
 - ☐ 2-pin
 - ☐ for unit injector
- 7 - Cable guide
 - ☐ only remove and install with stainless steel clamps (Pos. 2)



1.4 Removing and installing the wiring harness for unit injectors and glow plugs for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Key - T10310-

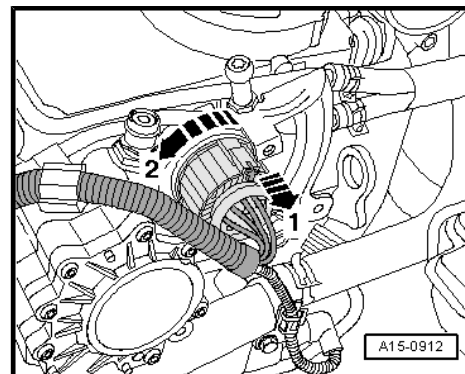
Removing



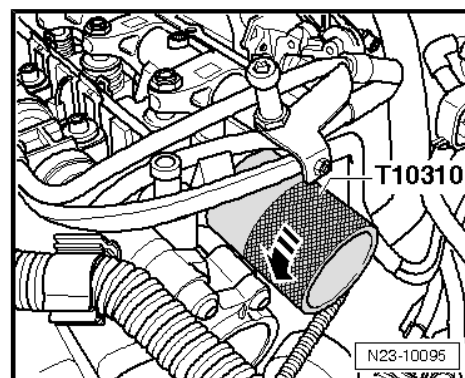
Caution

The removal and installation of the wiring harness must only be carried out by unscrewing and screwing on the clamps. By removing the cable guide from the clamps, the clamps will be bent apart and the larger clearance can lead to cable breakage. This applies both to the replacement of the unit injectors and to all work that does not require complete removal of the wiring harness.

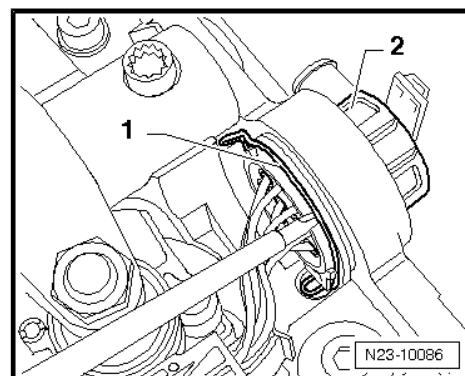
- Switch off ignition and pull out ignition key.
- Remove cylinder head cover ⇒ [page 72](#) .
- Disconnect central plug connection on cylinder head. To do so, pull the release mandrel in -arrow direction 1- and open the knurled nut in -arrow direction 2-.



- Place key - T10310- on the reduction ring and release the ring with a torquing angle of 90 ° (1/4 turn) in the -arrow direction-.

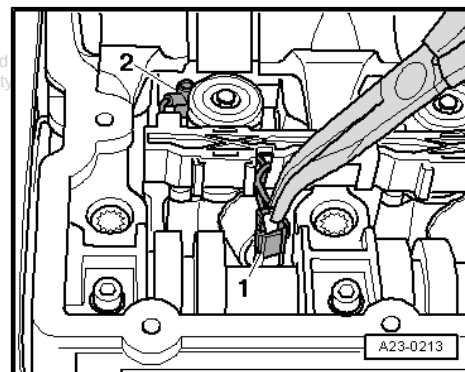


- Slightly raise the safety clamp -1- with a screwdriver and push through the central plug connection -2- towards the inside.



- Disconnect connectors -1- for unit injectors while pressing the locking pins.

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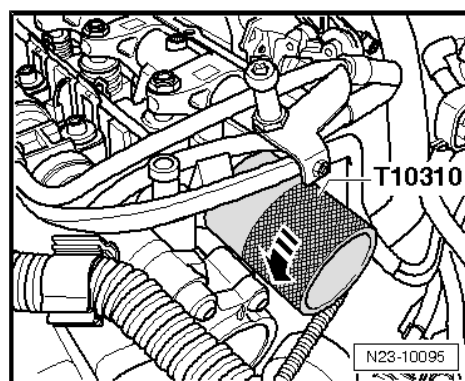
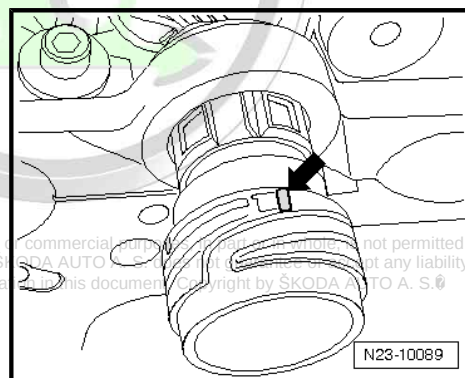
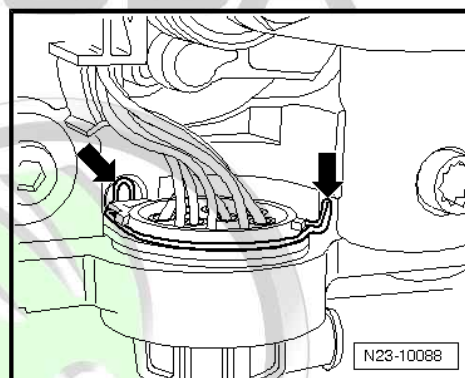
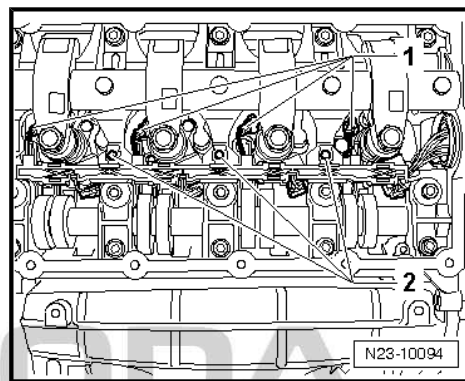


- Unplug connector of the glow plugs -1-. Fixing screws -2-, unscrew the stainless steel clamps and remove the entire wiring harness.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Expose wiring harness and tighten fixing screws to 10 Nm.
- Insert central plug connection through the opening in the bearing frame. In doing so, make sure that the locking clips -arrows- are in the correct position.
- Position the reduction ring (colour-coded "long" lug -arrow- is in the 12 o'clock position).
- Place key - T10310- on the reduction ring and secure the ring with a torquing angle of 90 ° ($\frac{1}{4}$ turn) in the opposite direction to the -arrow direction-.



Note

After correct installation of the reduction ring, the colour-coded "short" lug is in the 12 o'clock position.

- Place central plug connection on cylinder head and lock.
- Install cylinder head cover ➔ [page 72](#) .

1.5 Removing and installing the air filter for engines with code BKD, AZV

1 - intake hose

- ☐ to exhaust gas turbo-charger

2 - Air mass meter - G70-

3 - O-ring

- ☐ Replace if damaged.

4 - 2 Nm

5 - Air filter top part

- ☐ if during repairs the air filter housing is opened (except for air filter element change), it should be entered in the Service Schedule (change interval for air filter element is shortened)

6 - Bleeder hose

- ☐ to valve block

7 - Air filter element

8 - Air intake hose

- ☐ to the lock carrier

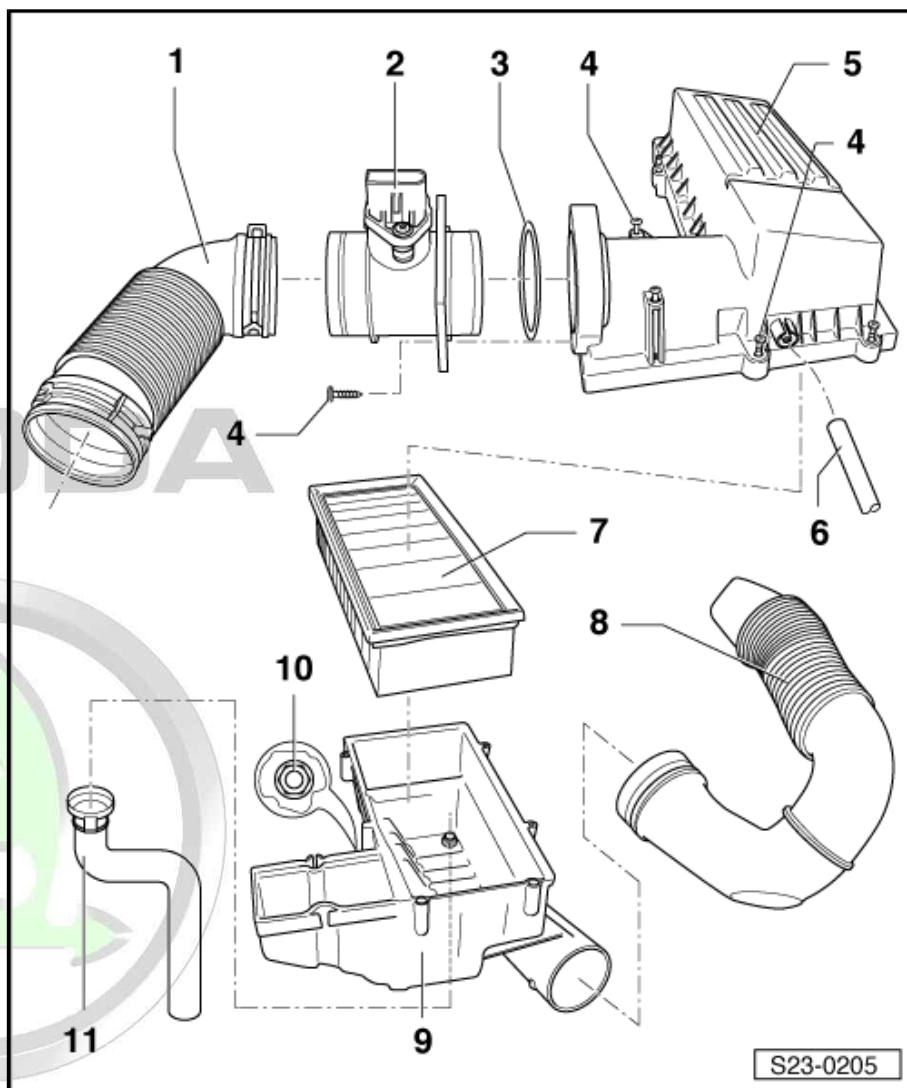
9 - Air filter bottom part

- ☐ with supports for drain pipe

10 - 8 Nm

11 - Drain pipe

- ☐ Vehicles 12.04 ➤



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1.6 Repairing unit injectors for engines with code BKD, AZV



Note

Observe rules for cleanliness ⇒ [page 2](#).

1 - 3 Nm + torque a further 270°
($\frac{3}{4}$ turn)

- ☐ replace



Note

Further torquing angle 270° must be carried out in one go!

2 - Valve-lever shaft

- ☐ Removing and installing
⇒ [page 210](#)

3 - 20 Nm + torque a further 90°
($\frac{1}{4}$ turn)

- ☐ replace

4 - Adjusting screw

- ☐ replace
- ☐ Grease the contact surface to the ball stud of the unit injector using grease - G 000 100-.

5 - Lock nut - 30 Nm

6 - The unit injector

- ☐ Removing and installing
⇒ [page 210](#)
- ☐ When installing, grease O-rings and pipes in cylinder head

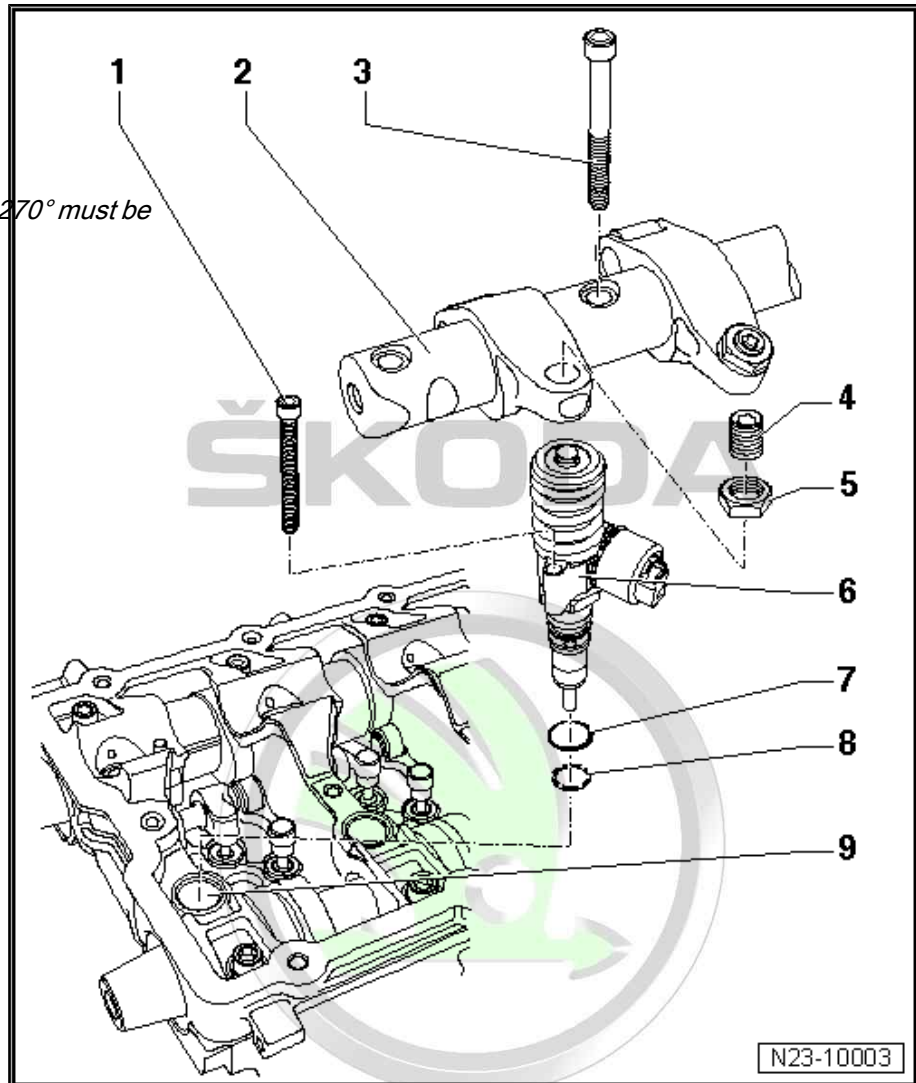
7 - O-ring

- ☐ Replace ⇒ [page 215](#)

8 - O-ring

- ☐ Replace ⇒ [page 215](#)

9 - Cylinder head



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1.7 Removing and installing unit injectors for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Valve lever - MP1-211 (VW 541/1A)-
- ◆ Valve assembly device - MP1-213 (2036) -
- ◆ Retaining plate - MP1-213/1 (2036/1)-
- ◆ Extractor - T10133/3-

- ◆ Extractor - T10163-
- ◆ Plug insert - T10054- (XZN 6, total length at least 75 mm)
- ◆ Counterholder - T10172 - or -MP 1-216-
- ◆ Dial gauge

1.7.1 Removing

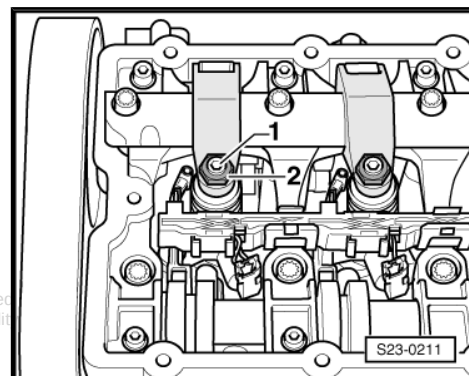
- Switch off ignition and pull out ignition key.
- Remove cylinder head cover ⇒ [page 72](#) .
- Undo the locknuts -2- of the adjusting screws -1- for all unit injectors and unscrew adjusting screws until the respective valve lever is resting on the spring plate of the unit injector.



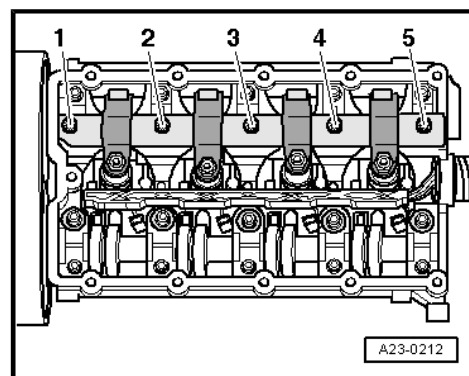
Note

Do not remove the screws from the valve lever shaft in order that the individual parts remain attached to the valve lever shaft. Mark the assignment of the valve lever if necessary.

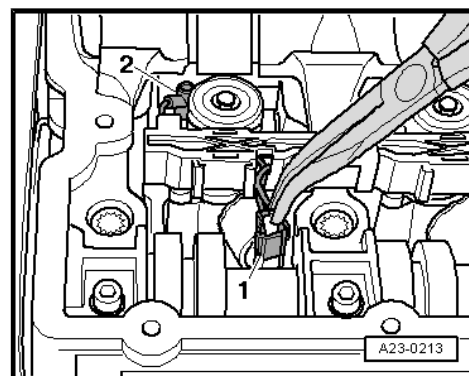
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- Remove screws -1-, -3- and -5-.
- Undo screws -2- and -4- and alternately remove in several stages, and remove valve lever shaft.



- Disconnect connectors -1- for unit injectors while pressing the locking pins.





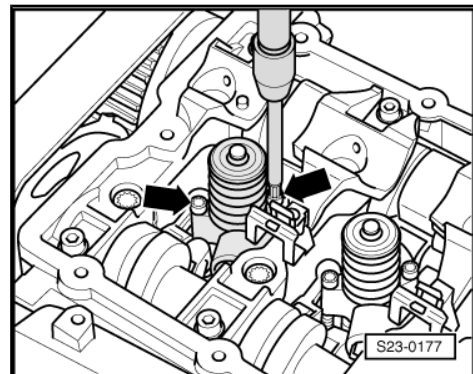
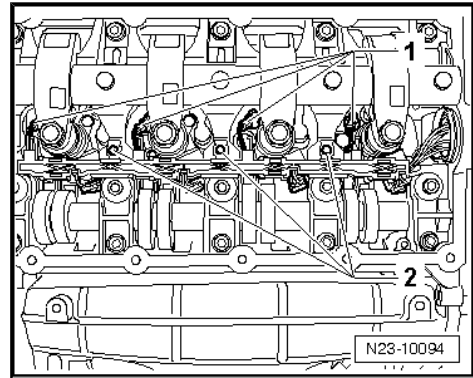
- Unplug connector -1- from the glow plugs.



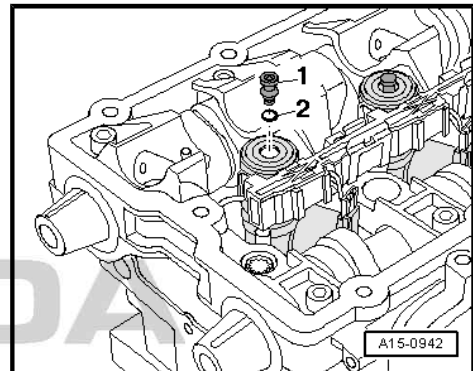
Caution

To remove and install the unit injectors, the screws for retaining clips must be loosened or tightened if necessary. If the wiring harness is removed from the retaining clips, the clips will be bent apart and the increased play can lead to a cable break.

- Unscrew screws -2- on the retaining clips and place the entire electrical wiring harness to one side.
- Unscrew screws -arrows- with plug insert - T10054- and remove from the holes.



- Always pull the ball studs -1- out of the respective unit injector.

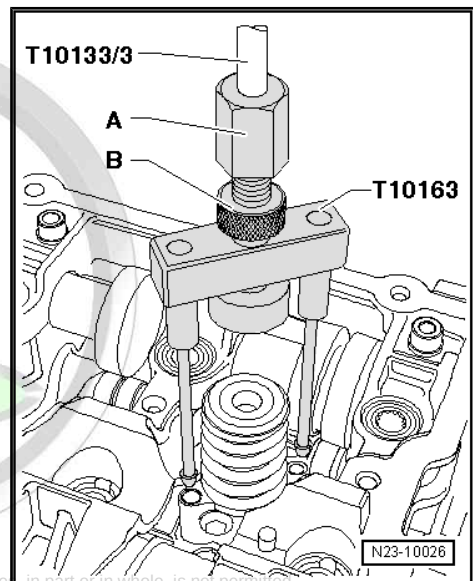


- Insert the extractor - T10163- into the holes for screws on the unit injector.
- Moderately tighten the spindle -A- to the unit injector. Tighten lock nut -B- by hand.
- Carefully knock on the extractor - T10133/3- to remove the unit injector from the cylinder head seat.



Note

Do not interchange the unit injectors, if necessary mark the assignment to each cylinder.



1.7.2 Installing



Caution

- *For any work requiring adjustment of the unit injector using the adjusting screw, the adjusting screw in the valve lever and the ball stud in the unit injector will need to be replaced; otherwise these components will be significantly worn.*
- *Fixing screws for unit injectors will also need to be replaced.*



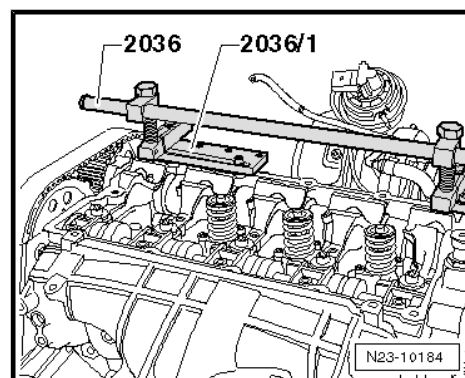
Note

- ◆ *When installing, grease O-rings and pipes in cylinder head*
- ◆ *New unit injectors are supplied with new O-rings.*
- ◆ *If the old unit injectors are reinstalled, replace the O-rings
⇒ [page 215](#),*
- ◆ *Grease the contact surfaces between the ball stud and the
adjusting screw using grease - G 000 100- .*
- Before installing the unit injector, check the two O-rings for correct position.
- The O-rings must not be twisted.
- The O-ring with the white marking is fitted in the lower groove of the unit injector.
- Moisten the O-rings and valve stem of the unit injector with oil.
- Check that the seat of the unit injector in the cylinder head is not contaminated by foreign bodies (chips, carbon deposits etc.), and clean with compressed air if necessary.
- Carefully insert the unit injector into the cylinder head.
- Place the assembly device for valves - 2036- with retaining plates - 2036/1- onto the bearing frame of the cylinder head as shown.



Note

If the retaining plates - 2036/1- cannot be removed because of the radiator for exhaust gas recirculation, use a large bodywork construction system.



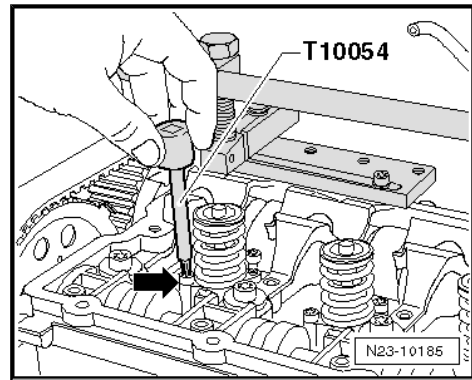


- Insert new fixing screws and carefully screw in without a lot of force using the plug insert - T10054- as far as the stop -arrow-.

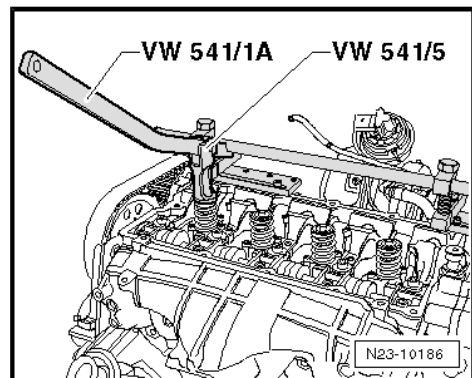


Caution

If the unit injector is pulled downwards by the fixing screws, there is a risk of the unit injector being drawn into the seat at an angle. This could lead to driving behaviour errors and starting difficulties. Therefore, the unit injector must only be screwed on once it has been pressed into its seat.

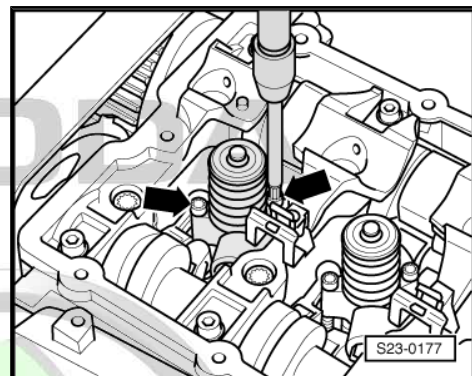


- Position the valve lever - VW 541/1 A- with thrust piece - VW 541/5- .
- Carefully press the unit injector with valve lever into the seat and hold with the same force.
- Carefully screw in the fixing screws of the unit injector without a lot of force as far as the stop.



- Alternately tighten the unit injector screws -arrows- using plug insert - T10054- as follows:

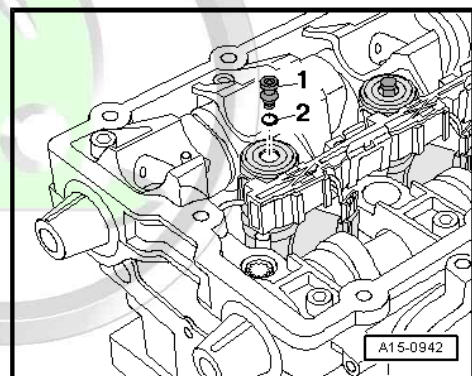
Stage	Apply
I	– Tighten with the torque wrench to 3 Nm.
II	– Using a rigid wrench torque a further 270° ($\frac{3}{4}$ turn).



Note

Further torquing angle 270° must be carried out in one go!

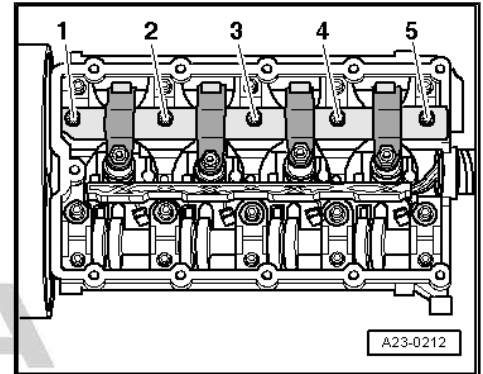
- Before inserting the valve-lever shaft, check that all ball studs -1- and O-rings -2- have been inserted in the unit injectors.



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- Screw on the valve-lever shaft with new screws as follows:

Se- quence	Apply
I	– Alternately tighten screws -2- and -4- in stages until the valve-lever shaft is resting on the bearing bush.
II	– Tighten screws -1-, -3- and -5- to 20 Nm + torque a further 90° (1/4 turn).
III	– Tighten screws -2- and -4- to 20 Nm + torque a further 90° (1/4 turn).



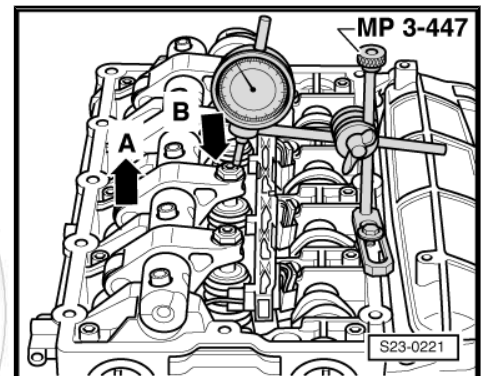
- Place a dial gauge on the adjusting screw of the unit injector.



Caution

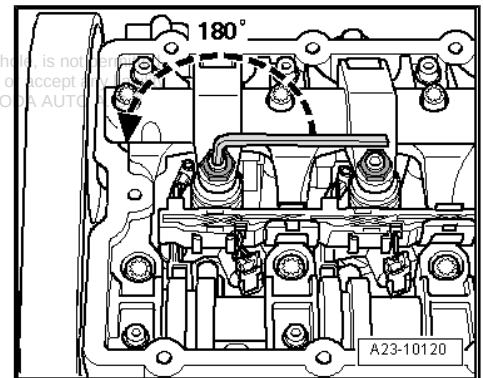
The engine may only be turned in the direction of engine rotation (clockwise) at the crankshaft.

- Turn the crankshaft in the running direction of the engine until the roller of the valve lever is on the drive cam tip.
- Valve lever roller side -arrow A- is at the highest point.
- Dial gauge -arrow B- is at the lowest point.
- Remove the dial gauge.
- Turn the adjusting screw into the valve lever until clear resistance can be felt (the unit injector is at the stop).
- Turn the adjusting screw in the opposite direction from the stop by about 180°
- Firmly hold the adjusting screw in this position and tighten the locknut to 30 Nm.



Further installation occurs in reverse order to removal. Pay attention to the following:

- Connect the central plug connection for unit injectors and glow plugs.
- Attach retaining clips.
- Install cylinder head cover ⇒ [page 72](#) .



1.8 Replacing the O-rings of the unit injector for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Assembly sleeve - T10164/1-
- ◆ Assembly sleeve - T10164/2-

Removing

- Remove the unit injector ⇒ [page 210](#) .
- Lever off the old O-rings from the unit injector with extreme care.
- Make sure that no burr arises at the base of the O-rings.



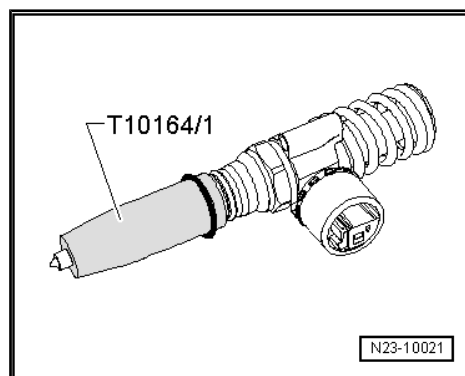
Installing



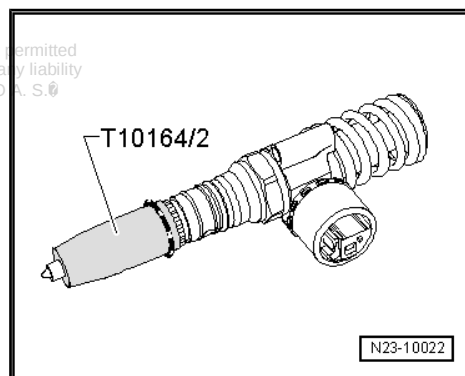
Note

- ◆ *Always use the assembly sleeves to install the O-rings. If not used, the O-rings may be damaged.*
- ◆ *Pay attention to the correct assignment of the O-rings to the grooves.*
- ◆ *Slide on the O-rings during assembly, do not roll. The O-rings must not be twisted in the seat of the unit injector.*

- Clean the contact surfaces for the O-rings in the unit injector with great care.
- Insert the assembly sleeve - T10164/1- on the unit injector up to the stop.
- Carefully slide the top, thicker O-ring onto the assembly sleeve and into the groove on the unit injector.
- Remove assembly sleeve.



- Insert the assembly sleeve - T10164/2- on the unit injector up to the stop.
- Carefully slide the lower O-ring with white marking onto the assembly sleeve and into the groove on the unit injector.
- Remove assembly sleeve.
- Install the unit injector ➔ [page 210](#) .



1.9 Installation locations for engines with code BMM - overview



Note

- ◆ *Some components are mounted under the engine cover.*
- ◆ *Remove engine cover ➔ [page 13](#) .*

The components A through G are not represented in the overview figure.

A - Warning light for engine electronics - K149-

- ☐ in the dash panel insert

B - Accelerator pedal position sender - G79- with accelerator pedal position sender 2 - G185-

- ☐ in footwell on the accelerator pedal

C - The brake light switch - F- and brake pedal switch - F63-

- ☐ in footwell on the brake pedal

D - Fuel pump relay - J17-

- ☐ on relay carrier

E - Clutch position sender - G476-

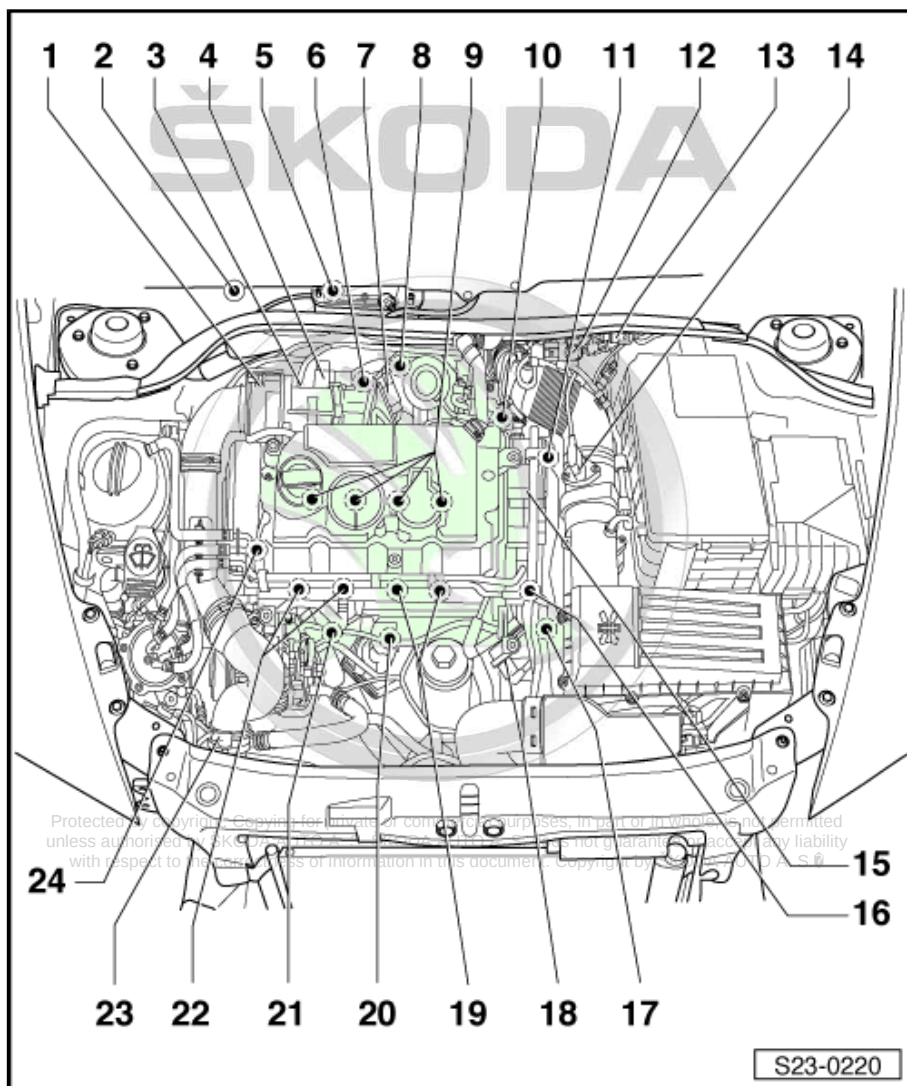
- ☐ at master cylinder

F - Automatic glow period control unit - J179-

- ☐ below E-box in the engine compartment

G - Relay and fuse carrier

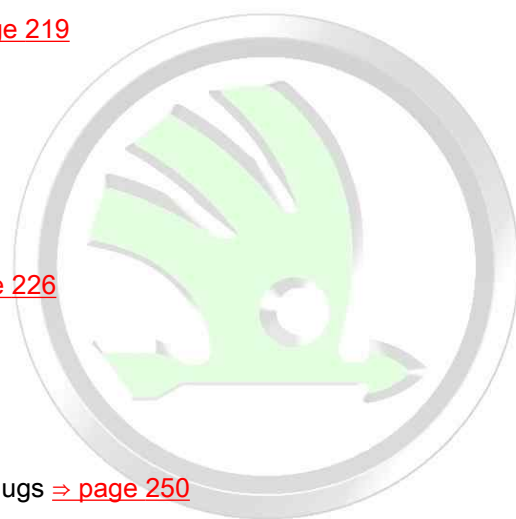
- ☐ with terminal 30 voltage supply relay - J317-
- ☐ with terminal 15 voltage supply relay - J329-
- ☐ E-box in the engine





compartment

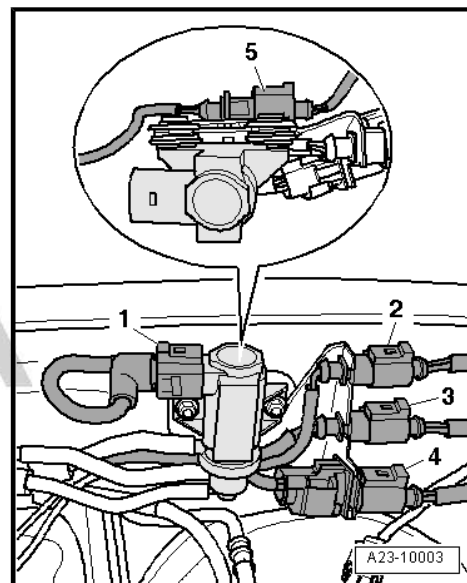
- 1 - Intake manifold flap motor - V157-
- 2 - Exhaust gas temperature sender 3 - G495- (Temperature sender downstream particle filter - G527 -)
- 3 - lambda probe - G39- with heating for lambda probe - Z19-
- 4 - Electric exhaust gas recirculation valve - N18- with EGR potentiometer - G212- and EGR control motor - V338-
- 5 - Diesel direct injection system control unit - J248-
- 6 - Exhaust gas temperature sender 2 - G448- (Temperature sender upstream particle filter - G506 -)
- 7 - Exhaust gas pressure sensor 1 - G450-
- 8 - Exhaust gas temperature sender 1 - G235- (Temperature sender upstream of turbocharger - G507-)
- 9 - The unit injectors
 - ☐ Valve for pump nozzle of cylinder 1 - N240-
 - ☐ Valve for pump nozzle of cylinder 2 - N241-
 - ☐ Valve for pump nozzle of cylinder 3 - N242-
 - ☐ Valve for pump nozzle of cylinder 4 - N243-
 - ☐ Removing and installing unit injectors ⇒ [page 210](#)
- 10 - Changeover valve for radiator of exhaust gas recirculation - N345-
- 11 - Coolant temperature sender - G62-
- 12 - Solenoid valve for charge pressure control - N75-
- 13 - Connector
 - ☐ at the front wall on the left
 - ☐ Summary of components ⇒ [page 219](#)
- 14 - Air mass meter - G70-
- 15 - Tandem pump
- 16 - Multipin plug connection
 - ☐ central for unit injectors
- 17 - engine speed sender - G28 -
 - ☐ Removing and installing ⇒ [page 226](#)
- 18 - Fuel temperature sender - G81-
- 19 - Glow plugs
 - ☐ Glow plug 3 - Q12-
 - ☐ Glow plug 4 - Q13-
 - ☐ Removing and installing glow plugs ⇒ [page 250](#)
- 20 - 3-pin connector
- Hall sender - G40-
- 21 - Coolant temperature sender at radiator outlet - G83-
- 22 - Glow plugs
 - ☐ Glow plug 1 - Q10-
 - ☐ Glow plug 2 - Q11-
 - ☐ Removing and installing glow plugs ⇒ [page 250](#)
- 23 - Charge pressure sender - G31- with intake air temperature sender - G42-
- 24 - Hall sender - G40-
 - ☐ for camshaft position



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Summary of components - plug on the front wall

- 1 - Solenoid valve for charge pressure control - N75-
- 2 - Plug (orange) for exhaust gas temperature sender 3 - G495- (temperature sender downstream particle filter - G527-)
- 3 - Plug for exhaust gas temperature sender 2 - G448- (temperature sender upstream of particle filter - G506-)
- 4 - Plug for lambda probe - G39- with heating for lambda probe - Z19-
- 5 - Plug for exhaust gas temperature sender 1 - G235- (temperature sender upstream of turbocharger - G507-)



1.10 Intake manifold - summary of components for engines with code BMM

- 1 - Gasket
☐ replace
- 2 - Intake manifold
- 3 - Sealing ring
☐ replace
- 4 - Supports
- 5 - Intake manifold flap motor - V157-

- ☐ The intake manifold flap is closed for about 3 seconds after switching off the engine and then opens again. This reduces the switch-off impact.

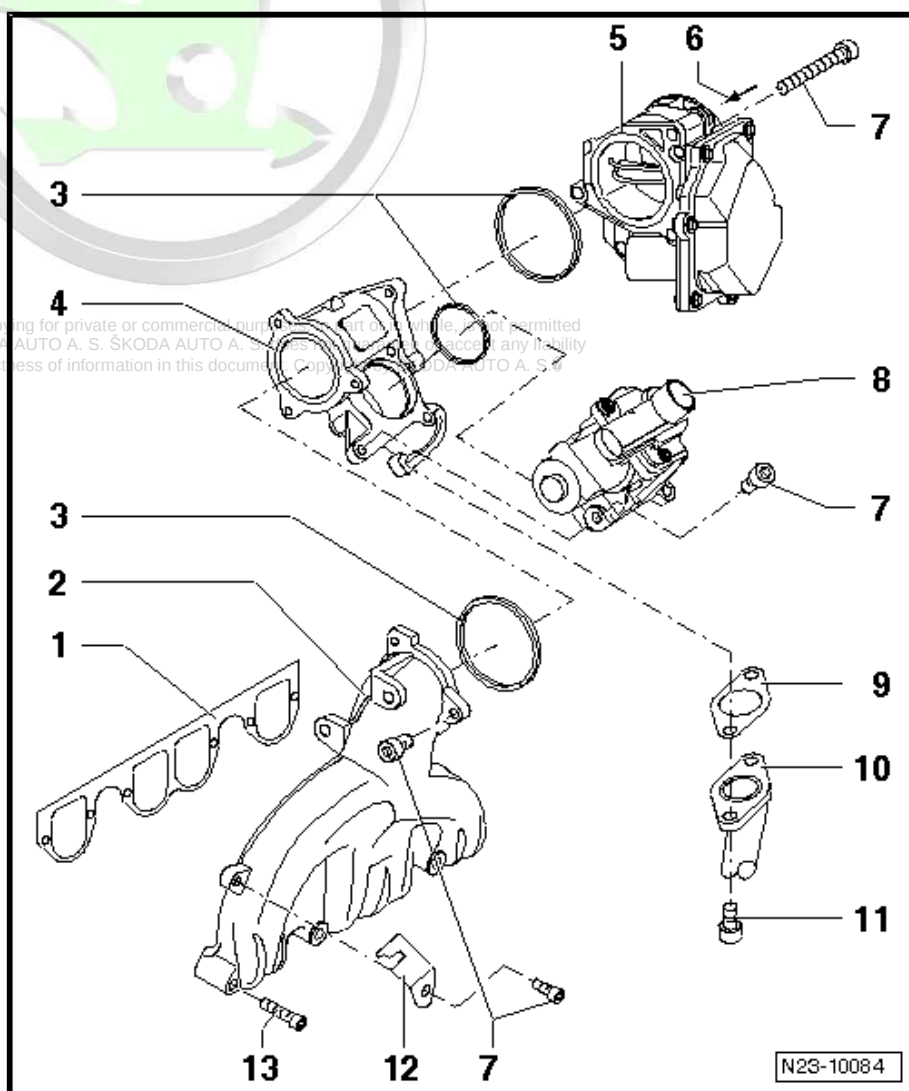
6 - from charge-air cooler

7 - 10 Nm

8 - Electric exhaust gas recirculation valve - N18- with EGR potentiometer - G212- and EGR control motor - V338-

- ☐ before installing, check sealing surfaces at intake manifold for dirt and clean as required
- ☐ After replacing, adapt new part as follows:
 - Switch ignition on and off; then wait 1 minute for the afterrun of the control units.
 - Start engine and run in idle for at least 1 minute.

- Interrogate the fault memory ⇒ Vehicle diagnostic tester.





- There must be no faults stored in the fault memory.
 - If a fault is stored, clear fault memory and repeat the entire procedure.

9 - Gasket

- ☐ replace

10 - Radiator

- ☐ for exhaust gas recirculation

11 - 22 Nm

12 - Mounting bracket

13 - 22 Nm

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1.11 Removing and installing the air filter for engines with code BMM

1 - intake hose

- ☐ to exhaust gas turbo-charger

2 - Air mass meter - G70-

3 - O-ring

- ☐ Replace if damaged.

4 - Vacuum hose

- ☐ To the solenoid valve for charge pressure limitation - N75-

5 - 2 Nm

6 - Air filter top part

- ☐ if during repairs the air filter housing is opened (except for air filter element change), it should be entered in the Service Schedule (change interval for air filter element is shortened)

7 - Air intake

- ☐ screwed onto lock carrier

8 - 2 Nm

9 - Air intake hose

10 - Drain pipe

11 - Air filter bottom part

- ☐ with supports for drain pipe

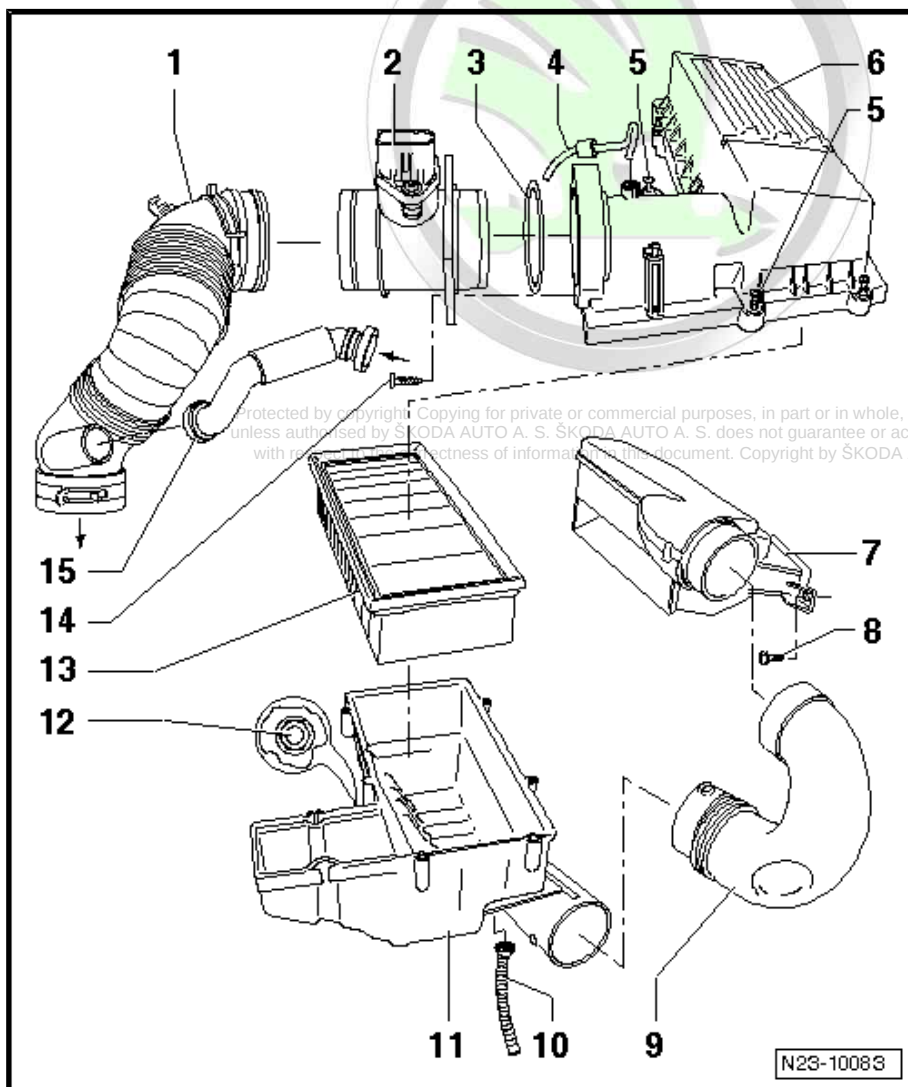
12 - 8 Nm

13 - Air filter element

14 - 2 Nm

15 - Connecting pipe

- ☐ from cylinder head cover
- ☐ for crankcase ventilation



1.12 Repairing unit injectors for engines with code BMM

- ◆ Always replace gasket rings and O-rings.

1 - 20 Nm + torque a further 90°
(1/4 turn)

- ☐ replace

2 - Valve-lever shaft

- ☐ with valve levers

3 - Counternut, 30 Nm

4 - Adjusting screw

- ☐ replace
- ☐ Grease the contact surface to the ball stud of the unit injector using grease - G 000 100- .

5 - Ball stud

- ☐ replace

6 - The unit injector

- ☐ Check ball pins for wear marks and replace if necessary
- ☐ Grease the contact surface for the adjusting screw using grease - G 000 100-
- ☐ Removing and installing [⇒ page 221](#)

7 - O-ring

- ☐ Replace [⇒ page 225](#)

8 - O-ring

- ☐ Replace [⇒ page 225](#)

9 - O-ring

- ☐ Replace [⇒ page 225](#)

10 - Heat-protection seal

- ☐ replace

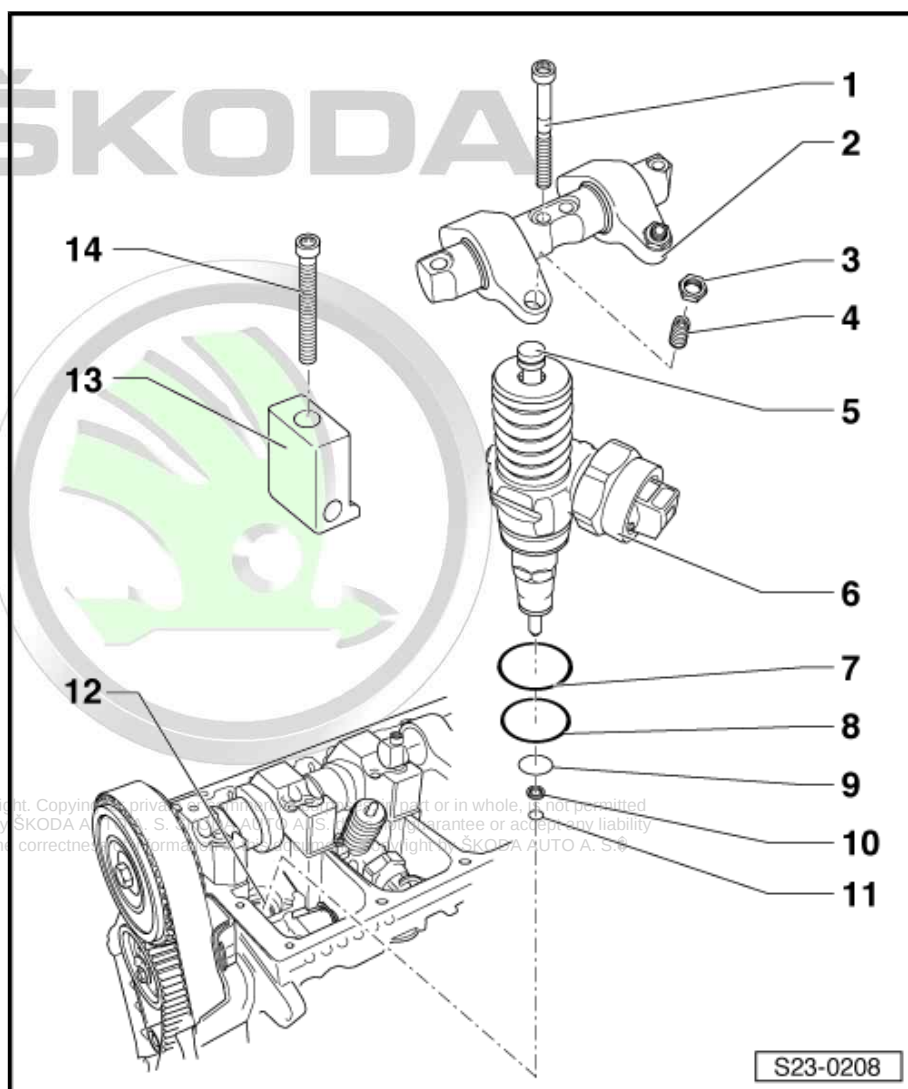
11 - Circlip

12 - Cylinder head

13 - Clamping pad

14 - 12 Nm + torque a further 270° (3/4 turn)

- ☐ replace



1.13 Removing and installing unit injectors for engines with code BMM

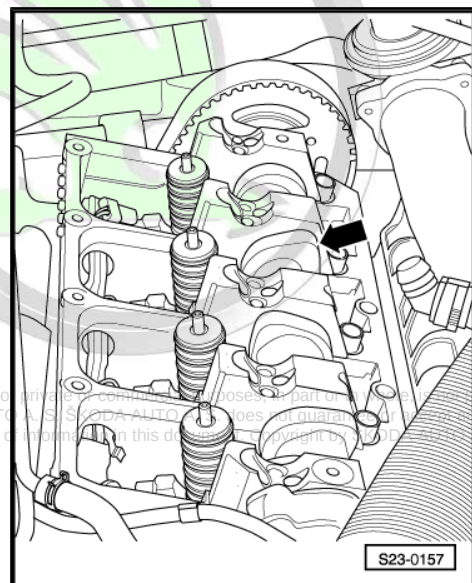
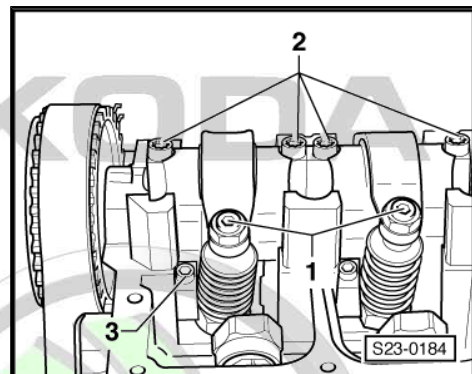
Special tools and workshop equipment required

- ◆ Extractor - T10055-
- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Dial gauge



1.13.1 Removing

- Remove top toothed belt guard and cylinder head cover
⇒ [page 83](#) .
- Undo the locknuts -2- of the adjusting screws for all unit injectors and unscrew adjusting screws until the respective valve lever is resting on the spring plate of the unit injector.
- Screw out fixing screws -2- for the valve-lever shaft from the outside to the inside and remove the valve-lever shaft.
- Adjust the camshaft so that the cam for cylinder 2 -arrow- is in the position shown. All clamping pads can be removed in this position.
- Unplug the connector from the unit injector. Support the opposite side of the connector with your finger in order to avoid twisting the connector.
- Unscrew fixing screw -3- of the clamping pad (illustration above) and remove the pad towards the camshaft.
- Insert extractor - T10055- in direction of the camshaft instead of the clamping pad in the slot of the unit injector.
- Remove the unit injector by knocking on the sleeve on the nut in the -direction of the arrow-.

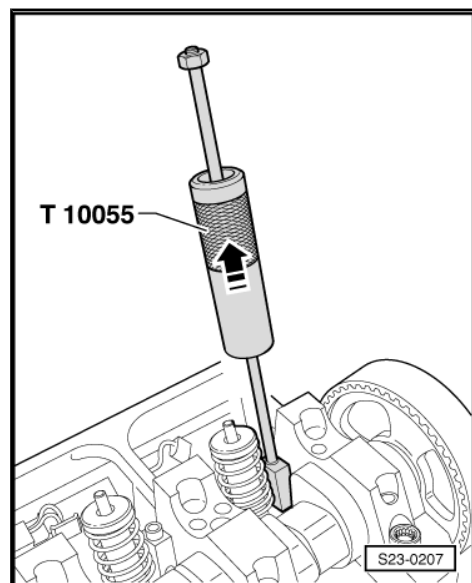


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Note

Do not interchange the unit injectors, if necessary mark the assignment to each cylinder.



1.13.2 Installing



Caution

- *For any work requiring adjustment of the unit injector using the adjusting screw, the adjusting screw in the valve lever and the ball stud in the unit injector will need to be replaced; otherwise these components will be significantly worn.*
- *Fixing screws for unit injectors will also need to be replaced.*



Note

- ◆ *Grease the contact surfaces between the ball stud and the adjusting screw using grease - G 000 100- .*
- ◆ *New unit injectors are supplied with O-rings and heat-protection seal.*
- ◆ *If the old unit injectors are reinstalled, replace the O-rings
⇒ [page 225](#) ,*
- Before installing the unit injector, check the correct position of the three O-rings, the heat-protection seal and the circlip.



Note

The O-rings must not be twisted.

- Oil the O-rings and place the unit injector with the greatest of care into the cylinder head.
- Slide the unit injector into the cylinder head seat up to the stop by exerting a uniform pressure.
- Place the clamping pad in the side slot of the unit injector.



Note

If the unit injector is not perpendicular to the clamping pad the fixing screw may loosen and cause damage to the unit injector or cylinder head.

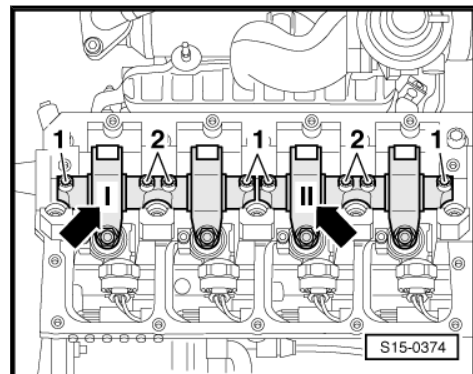
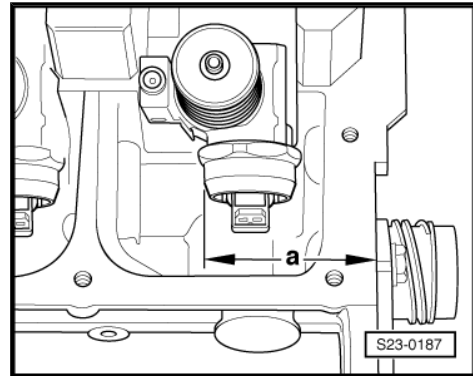
- Align the unit injector as follows:
- Screw the new fixing screw in the clamping pad until the unit injector can still easily be turned.
- Set unit injector at a right angle to the bearing shell of the camshaft.



- Using a caliper gauge, check dimension -a- from the outer side of the cylinder head to the cylinder surface of the unit injector.

Cylinder	Dimension -a-
1	333.0 ± 0.8 mm
2	245.0 ± 0.8 mm
3	153.6 ± 0.8 mm
4	65.6 ± 0.8 mm

- Adjust the unit injector if required, tighten the fixing screw to a torque of 12 Nm and then torque a further 270° (¾ turn). Tightening may occur in successive stages.
- Mount valve-lever shaft and tighten up the new fixing screws as follows:
 - First tighten the inside -2- then both outside -1- screws by hand. In the same sequence tighten to 20 Nm and torque a further 90° (¼ turn).



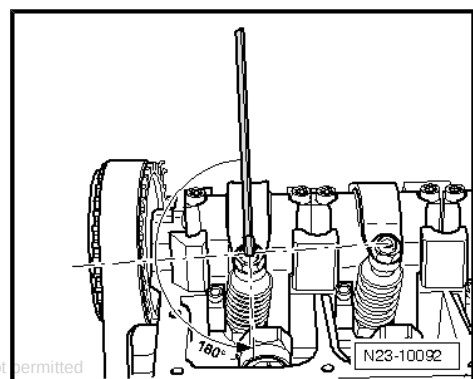
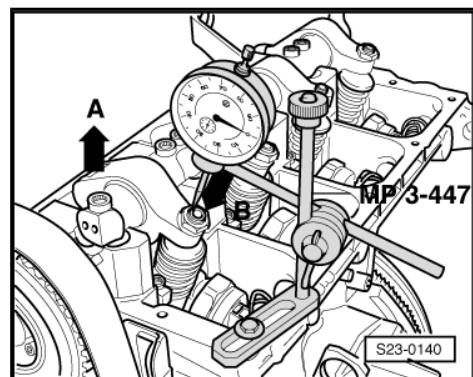
- Place a dial gauge on the adjusting screw of the unit injector.



Caution

The engine may only be turned in the direction of engine rotation (clockwise) at the crankshaft.

- Turn the crankshaft in the running direction of the engine until the roller of the valve lever is on the drive cam tip.
 - Roller side -arrow A- is on the highest point.
 - Dial gauge -arrow B- is on the lowest point.
- Remove the dial gauge.
- Turn the adjusting screw in the valve lever until one feels a significant resistance (the unit injector is against the stop).
- Turn the adjusting screw in the opposite direction from the stop by about 180°
- Firmly hold the adjusting screw in this position and tighten up the lock nut using a torque of 30 Nm.
- Fit the plug of the unit injector and install the cylinder head cover and the top toothed belt guard.



1.14 Replacing the O-rings of the unit injector for engines with code BMM

Special tools and workshop equipment required

- ◆ Assembling sleeves - T10056-

Removing

- Lever off the O-rings from the grooves of the unit injector with extreme care.
- Make sure, above all, that the contact surfaces in the grooves for the O-rings are not damaged.

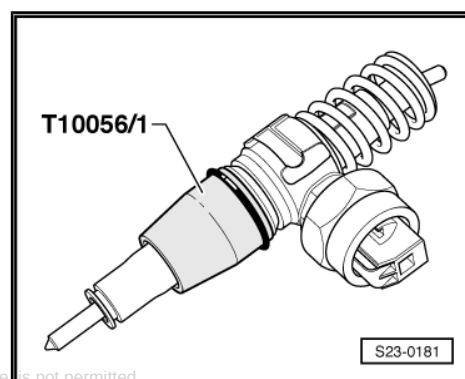
Installing



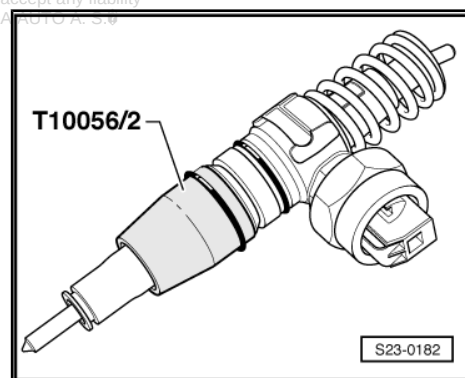
Note

- ◆ *Always use the assembly sleeves to install the O-rings. If they are not used there is a risk that the O-rings may become damaged.*
- ◆ *Observe the correct allocation of the O-rings to the slots: The ring thickness reduces in the direction of the injection nozzle.*
- ◆ *Avoid rolling the O-rings when sliding them on. The O-rings must not be turned inwards on the groove of the unit injector.*

- Remove the heat-protection seal along with the circlip.
- Clean the contact surfaces for the O-rings in the grooves of the unit injector with great care.
- Insert the assembly sleeve - T10056/1- on the unit injector up to the stop.
- Carefully slide the upper, thicker O-ring onto the assembly sleeve and in the groove of the unit injector.
- Remove assembly sleeve.



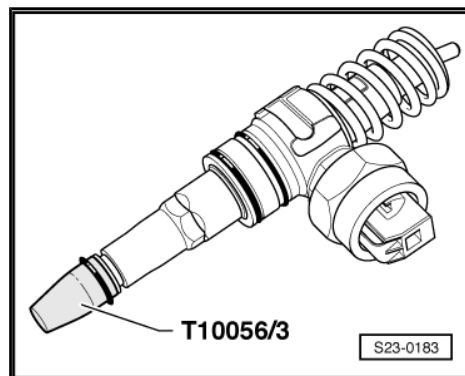
- Insert the assembly sleeve - T10056/2- on the unit injector up to the stop.
- Carefully slide the middle, thinner O-ring onto the assembly sleeve and in the groove of the unit injector.
- Remove assembly sleeve.





- Insert the assembly sleeve - T10056/3- on the unit injector up to the stop.
- Carefully slide the lower O-ring onto the assembly sleeve and insert it in the groove of the unit injector.
- Remove assembly sleeve.
- Slide on a new heat-protection seal together with the circlip.

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1.15 Removing and installing the engine speed sender - G28-

Special tools and workshop equipment required

- ♦ Hose clamps up to Ø 25 mm - MP7-602 (3094) -
- ♦ Assembly tool - T10118-

Removing

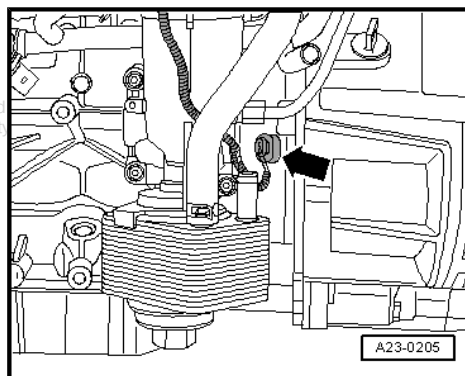
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Unclip the coolant hoses at the engine oil cooler with hose clamps and remove the coolant hoses.
- Remove oil filter holder ⇒ [page 124](#) .
- Remove the plug -arrow- on the engine speed sender - G28- with the assembly device - T10118 - and lay the electrical cable to the side.

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Note

To unlock the plug without using the assembly device - T10118- , the unlock button must be pressed at the plug using a screwdriver and at the same time unlock the unlock button with a thin wire hook.



- Unscrew the fixing screw -2- for the engine speed sender - G28- -1-.

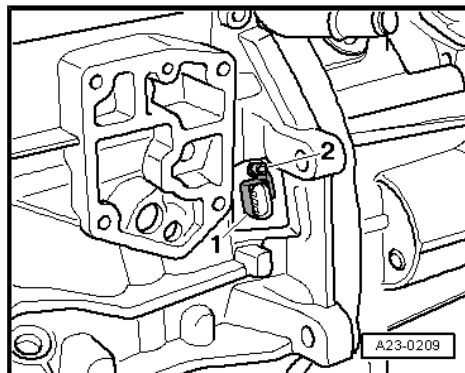
Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Install oil filter holder ⇒ [page 124](#) .

Specified torque

Component	Nm
Engine speed sender - G28- on the sealing flange	5



2 Engine control unit

2.1 Removing and installing engine control unit

Note

If the engine control unit should be replaced, connect vehicle diagnosis, measurement and information system - VAS 5051- and in the guided fault detection system carry out "replace engine control unit".

Special tools and workshop equipment required

- ◆ Body saw e.g. -V.A.G 1523 A-

Removing

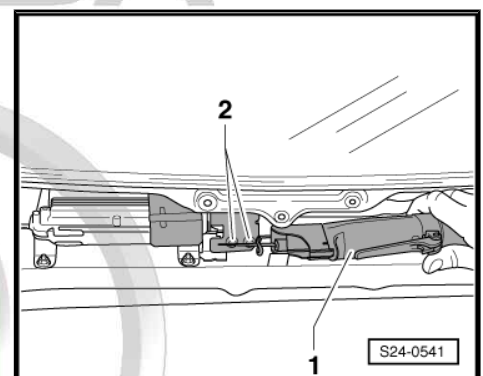
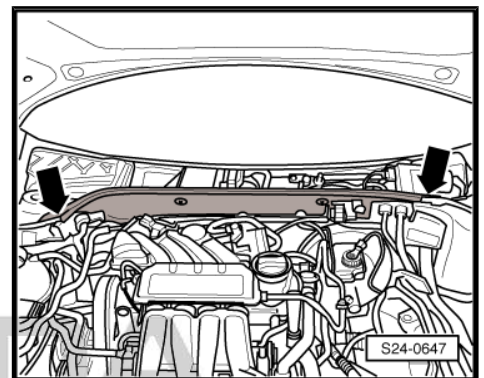
- Switch off ignition.
- Remove the cooling water tank cover ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove bulkhead plenum chamber -arrows-.
- Remove windscreen wiper and washer system ⇒ Electrical System ⇒ Rep. gr. 92 .

Vehicles with protective cover

- Cut with body saw -1- a slot for the cross-head screwdriver in the heads of the pull-off screws -2-.

Note

- ◆ *It must be sawed twice with the body saw, so that the slot is wide enough, in order to unscrew the screws with a suitable screwdriver.*
- ◆ *The pull-off screws until are inserted with locking agent.*
- Unscrew bolts -2-.

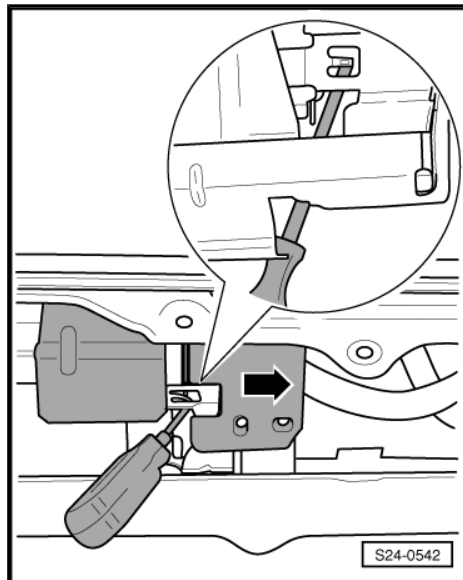




- Lift locking tab of protective cover with a cross-head screw-driver.
- Push the protective cover in the -direction of the arrow- out of the bracket for engine control unit.

Continued for all vehicles

- Disconnect front plug -1- and remove from engine control unit.



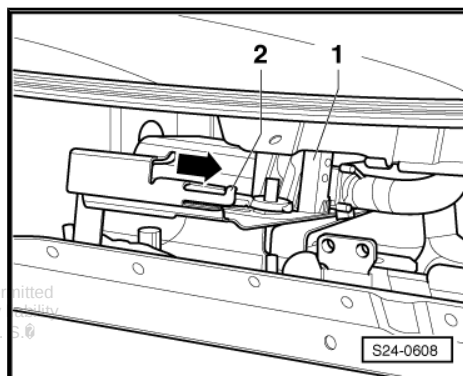
- Lever off retaining bracket -2- slightly.
- Push engine control unit out of the bracket -arrow-.
- Disconnect rear plug and remove from engine control unit.

Installing



Note

For vehicles with protective cover, the metal swarfs must be suctioned out of the plenum chamber before installing the engine control unit.



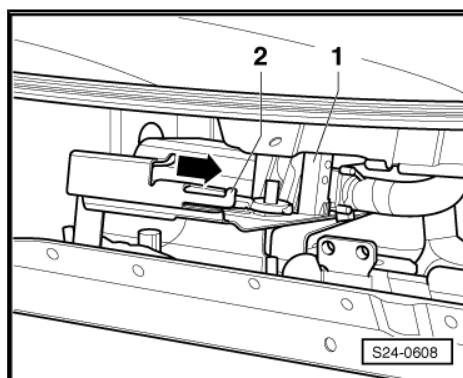
- Connect rear plug to engine control unit and lock.
- Push engine control unit into the bracket and lock the retaining bracket -2-.
- Connect front plug to engine control unit and lock.

For vehicles with protective housing

- Fasten protective cover with new pull-off screws (before tightening align the protective cover in such a way that it does not come into contact with the surrounding components)

Continued for all vehicles

- Install windscreen wiper and washer system ⇒ Electrical System ⇒ Rep. gr. 92 .
- Install bulkhead plenum chamber and plenum chamber cover ⇒ Body Work ⇒ Rep. gr. 66 .



26 – Exhaust system

1 Removing and installing parts of the exhaust system

Note

- ◆ The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.
- ◆ Replace the gaskets and the self-locking nuts.
- ◆ When performing installation work on the exhaust system, make sure the exhaust system is not mounted under tension and has adequate clearance from the vehicle body. If necessary, slacken the clamping sleeve and align the silencers and exhaust pipe so as to create adequate clearance between these components and the vehicle body, and to ensure that the weight of the exhaust system is evenly distributed over the hangers.

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1.1 Summary of components for engines with code BKD, AZV

1 - Rear tunnel bridge

2 - Middle part of exhaust system

- ☐ for first equipment building unit with rear part of exhaust gas system, replace individually when carrying out repairs
- ☐ Separation point
⇒ [page 238](#)
- ☐ Installing the exhaust system without tension
⇒ [page 239](#)

3 - Retaining strap

- ☐ Replace if damaged.
- ☐ Pay attention to the part number

4 - Shackle

5 - 23 Nm

6 - Shackle

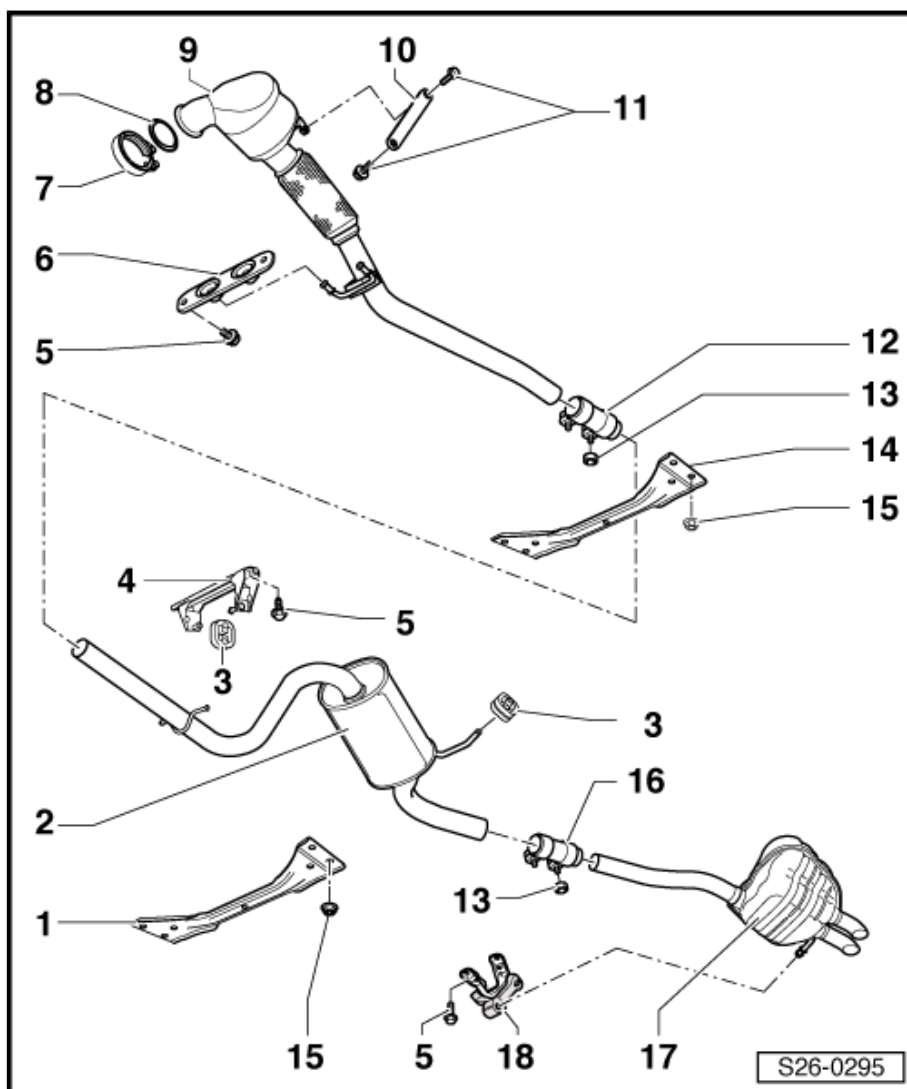
7 - Warm-type clamp - 7 Nm

- ☐ replace

8 - Gasket

9 - Exhaust pipe

- ☐ with catalytic converter
- ☐ protect against shocks and blows
- ☐ with decoupling element
- ☐ do not twist decoupling element more than 10° - risk of damage





- ☐ Installing the exhaust system without tension ⇒ [page 239](#)

10 - Countersupport

11 - 40 Nm

12 - Front clamping sleeve

- ☐ align exhaust system free of stress before fitting on ⇒ [page 239](#)
- ☐ Tighten screwed connections uniformly

13 - 23 Nm

14 - Front tunnel bridge

15 - 20 Nm

16 - Rear clamping sleeve

- ☐ Note installation position: ⇒ [page 238](#) .
- ☐ Tighten screwed connections uniformly

17 - Rear part of exhaust system

- ☐ for first equipment building unit with middle part of exhaust gas system, replace individually when carrying out repairs
- ☐ Separation point ⇒ [page 238](#)
- ☐ Installing the exhaust system without tension ⇒ [page 239](#)

18 - Shackle

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1.2 Summary of components for engines with code BMM

1 - Exhaust gas pressure sensor 1 - G450-

2 - Mounting bracket

- ☐ for pressure line

3 - Pressure line - 45 Nm

4 - 10 Nm

5 - lambda probe - G39- - 50 Nm

- ☐ the thread of new lambda probes must be coated with assembly paste
- ☐ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the hot bolt paste - G 052 112 A3- must not get into the slots of the probe body

6 - Exhaust gas temperature sender 2 - G448- (Temperature sender upstream particle filter - G506-)

- ☐ 45 Nm
- ☐ the thread of new temperature transmitters must be coated with assembly paste
- ☐ Grease only the thread with hot bolt paste - G 052 112 A3- for re-used temperature sender.

7 - Pre-exhaust pipe with diesel particle filter

- ☐ Removing and installing ⇒ [page 234](#)

8 - Exhaust gas temperature sender 3 - G495- (Temperature sender downstream particle filter - G527-)

- ☐ 45 Nm
- ☐ the thread of new temperature transmitters must be coated with assembly paste
- ☐ Grease only the thread with hot bolt paste - G 052 112 A3- for re-used temperature sender.

9 - Identification

- ☐ for front clamping sleeve

10 - to middle part of exhaust system

11 - 23 Nm

12 - Shackle

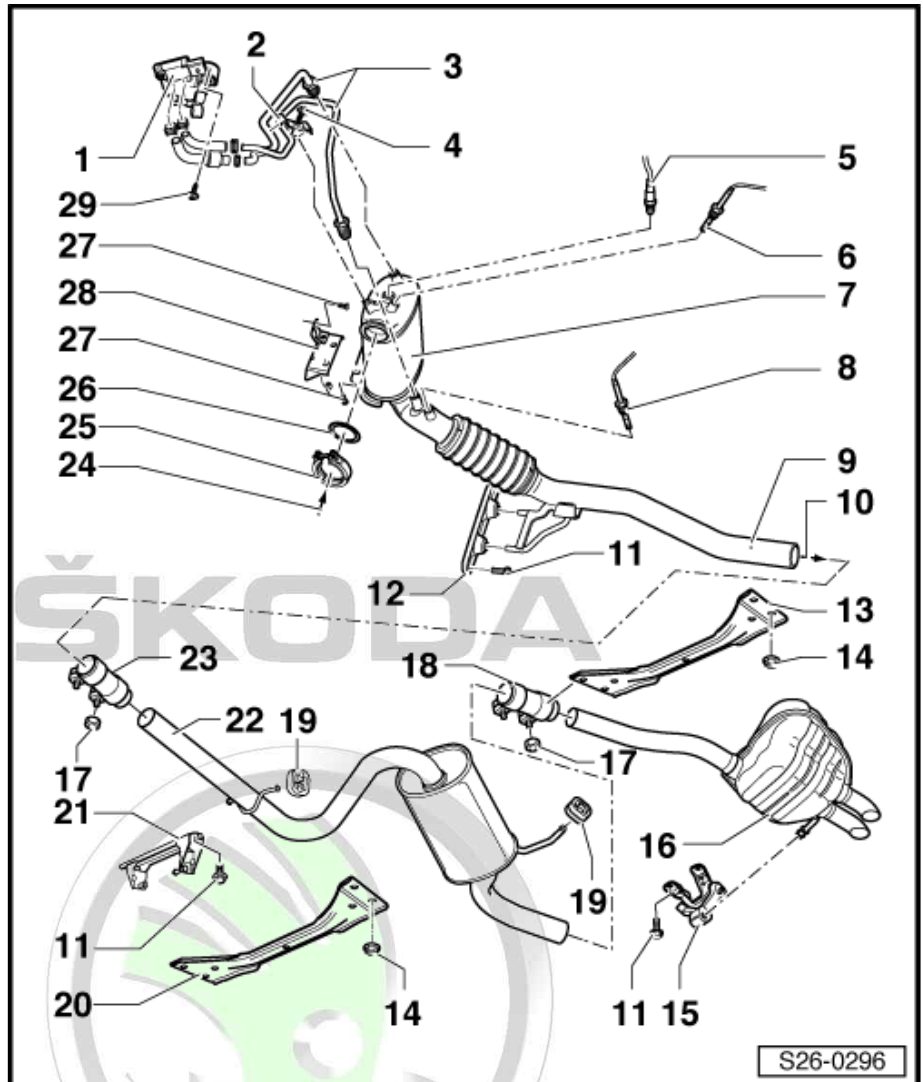
13 - Front tunnel bridge

14 - 20 Nm

15 - Shackle

16 - Rear part of exhaust system

- ☐ for first equipment building unit with middle part of exhaust gas system, replace individually when carrying out repairs





- ☐ Separation point ➔ [page 238](#)
- ☐ Installing the exhaust system without tension ➔ [page 239](#)

17 - 23 Nm

18 - Front clamping sleeve

- ☐ align exhaust system free of stress before fitting on ➔ [page 239](#)
- ☐ Tighten screwed connections uniformly

19 - Retaining strap

- ☐ Replace if damaged.
- ☐ Pay attention to the part number

20 - Rear tunnel bridge

21 - Shackle

22 - Middle part of exhaust system

- ☐ for first equipment building unit with rear part of exhaust gas system, replace individually when carrying out repairs
- ☐ Separation point ➔ [page 238](#)
- ☐ Installing the exhaust system without tension ➔ [page 239](#)

23 - Rear clamping sleeve

- ☐ Note installation position: ➔ [page 238](#) .
- ☐ Tighten screwed connections uniformly

24 - from exhaust turbocharger

25 - Warm-type clamp - 7 Nm

- ☐ replace

26 - Gasket

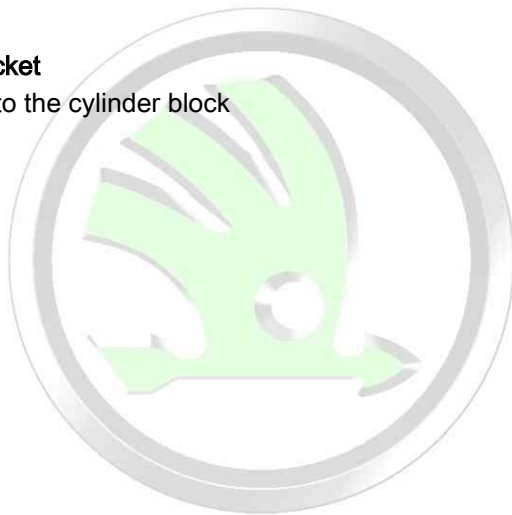
- ☐ replace
- ☐ Check fitting position

27 - 23 Nm

28 - Mounting bracket

- ☐ screwed onto the cylinder block

29 - 8 Nm



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1.3 Exhaust system for vehicles with four-wheel drive - Summary of components

1 - Exhaust gas pressure sensor 1 - G450-

2 - Mounting bracket

- ☐ for pressure line

3 - Pressure line - 45 Nm

4 - 10 Nm

5 - Lambda probe - G39- , 50 Nm

- ☐ the thread of new lambda probes must be coated with assembly paste
- ☐ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the hot bolt paste - G 052 112 A3- must not get into the slots of the probe body

6 - Exhaust gas temperature sender 2 - G448- (Temperature sender upstream particle filter - G506-)

- ☐ 45 Nm
- ☐ the thread of new temperature transmitters must be coated with assembly paste
- ☐ Grease only the thread with hot bolt paste - G 052 112 A3- for re-used temperature sender.

7 - Pre-exhaust pipe with diesel particle filter

- ☐ Removing and installing ⇒ [page 234](#)

8 - Exhaust gas temperature sender 3 - G495- (Temperature sender downstream particle filter - G527-)

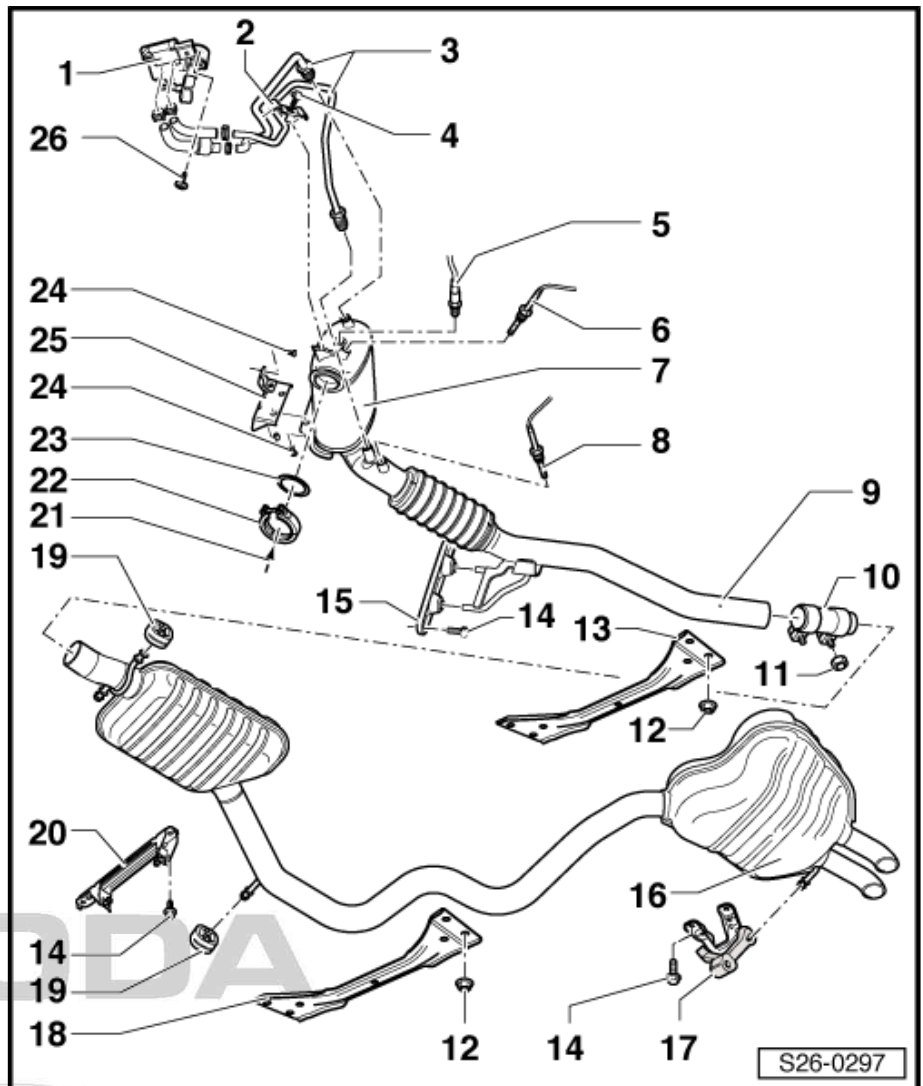
- ☐ 45 Nm
- ☐ the thread of new temperature transmitters must be coated with assembly paste
- ☐ Grease only the thread with hot bolt paste - G 052 112 A3- for re-used temperature sender.

9 - Identification

- ☐ for clamping sleeve

10 - Front clamping sleeve

- ☐ align exhaust system free of stress before fitting on ⇒ [page 239](#)
- ☐ Tighten screwed connections uniformly





11 - 23 Nm

12 - 20 Nm

13 - Front tunnel bridge

14 - 23 Nm

15 - Shackle

16 - Middle and rear part of the exhaust system

- ☐ replace complete when carrying out repairs
- ☐ Installing the exhaust system without tension ⇒ [page 239](#)

17 - Shackle

18 - Rear tunnel bridge

19 - Retaining strap

- ☐ Replace if damaged.
- ☐ Pay attention to the part number

20 - Shackle

21 - from exhaust turbocharger

22 - Warm-type clamp - 7 Nm

- ☐ replace

23 - Gasket

- ☐ replace
- ☐ Check fitting position

24 - 23 Nm

25 - Mounting bracket

- ☐ screwed onto the cylinder block

26 - 8 Nm

1.4 Removing and installing pre-exhaust pipe with diesel particle filter

Special tools and workshop equipment required

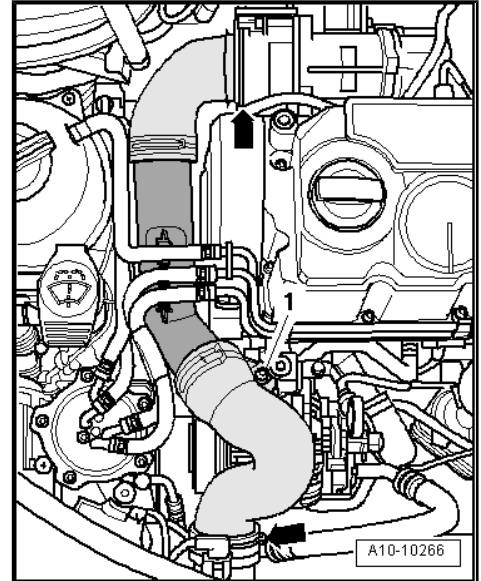
- ◆ Ratchet ring wrench - T10384- (for vehicles with four-wheel drive)
- ◆ Lambda probe open ring spanner set
- ◆ Pliers for spring-type clips
- ◆ Hot bolt paste - G 052 112 A3-

Removing

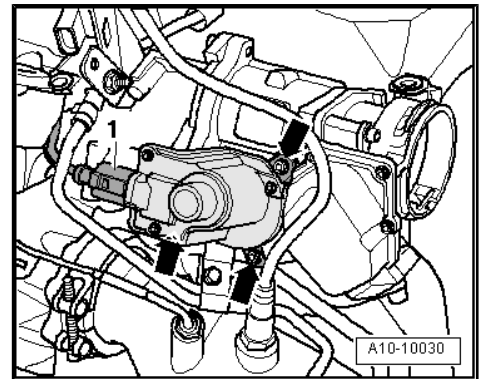
- Remove engine cover ⇒ [page 13](#) .



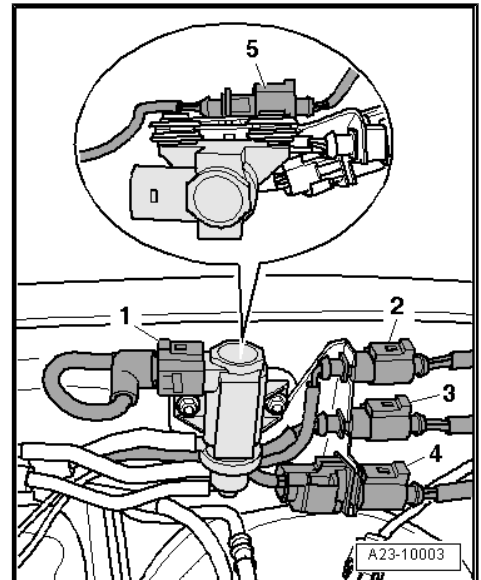
- Release fuel hoses and coolant hoses at right charge air pipe.
- Remove right charge air pipe.
- Check intake manifold flap motor - V157- ➔ [page 246](#) .



- Disconnect plug -1- and remove electric exhaust gas recirculation valve - N18- -arrows- ➔ [page 246](#) .



- Disconnect the following plug connections and move clear the cables.
- ◆ Position 2: exhaust gas temperature sender 3 - G495- (temperature sender downstream from particle filter - G527-)
- ◆ Position 3: exhaust gas temperature sender 2 - G448- (temperature sender upstream from particle filter - G506-)
- ◆ Position 4: lambda probe - G39-
- Remove right front wheel.
- Remove noise insulation ➔ Body Work ➔ Rep. gr. 50 .
- Remove bottom part of right wheelhouse liner ➔ Body Work ➔ Rep. gr. 66 .
- Disconnect plug at oil level and oil temperature sender - G266- ➔ [page 122](#) .
- Remove drive shaft screening from the engine (if present).
- Unscrew the right drive shaft from the gearbox flange.
- Remove front tunnel bridge.



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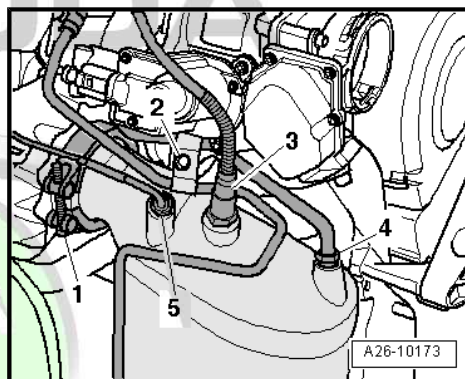
Vehicles with auxiliary heating

- Unscrew screws for coolant pipes for auxiliary heating and push off pipes to the left.

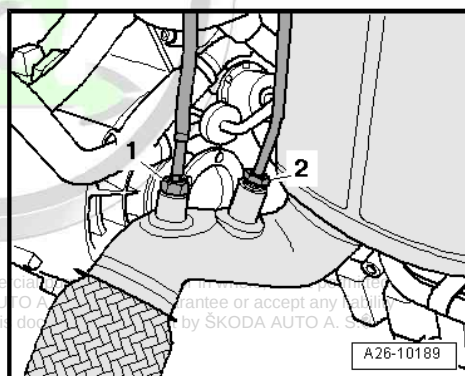
Vehicles with front-wheel drive



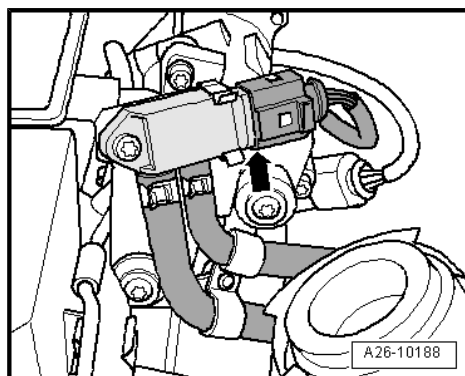
- Unscrew lambda probe -3-.
- Remove exhaust gas temperature sender 2 - G448- (temperature sender upstream particle filter - G506-) -5-.
- Unbolt bracket -2- for pressure lines.
- Unbolt pressure line -4- at diesel particle filter.
- Remove fixing clamp -1- for diesel particle filter.



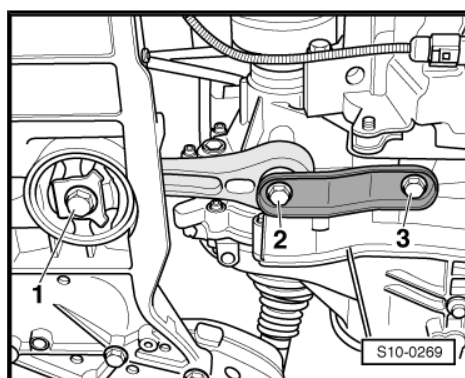
- Unscrew exhaust gas temperature sender 3 - G495- (temperature sender downstream particle filter - G527-) -1- from exhaust pipe downstream diesel particle filter.
- Unscrew pressure line -2- for exhaust gas pressure sensor 1 - G450- .



- Disconnect plug -arrow- and remove exhaust gas pressure sensor 1 - G450 - with pressure lines.



- Remove screws -2- and -3-.



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- Release screws -arrows- at holder for diesel particle filter.
- Slacken nuts of front clamping sleeve.

ŠKODA

- Unscrew hanger of exhaust system -arrows-.

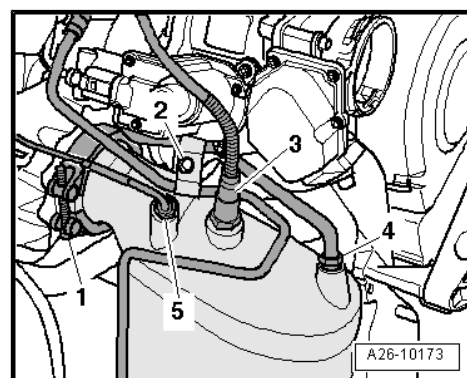
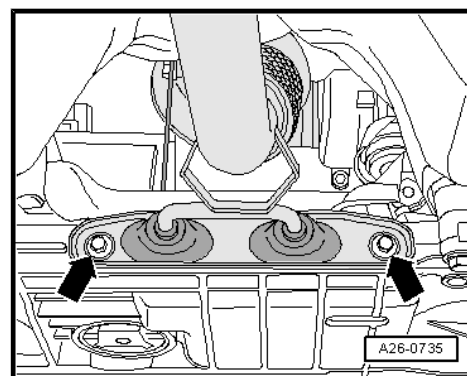
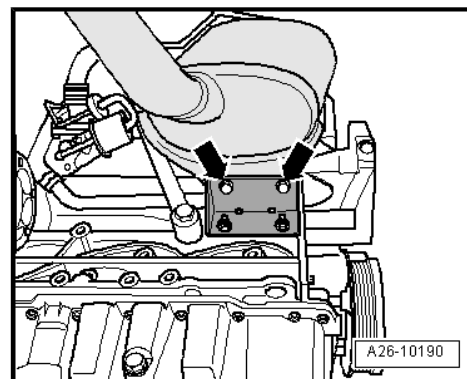


Note

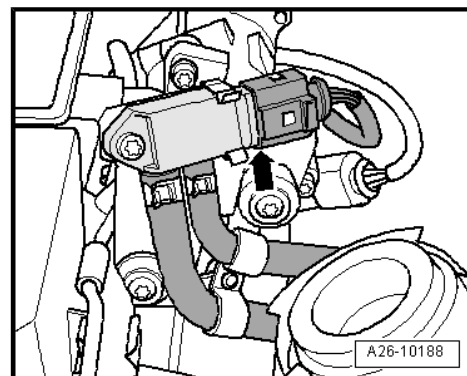
- ◆ For the following working steps a 2nd mechanic is required.
 - ◆ The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.
 - ◆ When removing the diesel particle filter slightly raise the heat shield, in order to avoid damage.
- Remove the pre-exhaust pipe with diesel particle filter by turning clockwise 180°; to do so slightly push the engine/gearbox assembly towards the front.

Vehicles with four-wheel drive

- Remove assembly carrier with steering gear ⇒ Chassis ⇒ Rep. gr. 40 .
- Remove propshaft from gearbox ⇒ Gearbox ⇒ Rep. gr. 39 and secure it to the left on the body.
- Remove fixing clamp -1- for diesel particle filter.



- Disconnect plug -arrow- and remove exhaust gas pressure sensor 1 - G450 - with pressure lines.





- Release nuts -1- using the ratchet ring wrench - T10384- .
- Slacken nuts of clamping sleeve.



Note

- ◆ For the following working steps a 2nd mechanic is required.
- ◆ The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.
- Push engine/gearbox assembly forwards and remove exhaust pipe with diesel particulate filter downwards. Make sure that the exhaust gas pressure sensor 1 - G450 - with connected cables and electrical lines is not damaged.

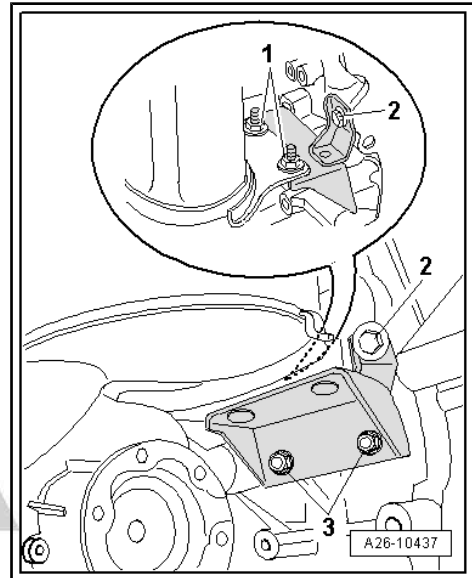
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Note

- ◆ Replace the clamp, sealing rings and self-locking nuts.
- ◆ Secure all hose connections with corresponding hose clips.
- ◆ All cable straps which are detached when removing, should be attached again in the same place when installing.
- Observe the assembly instruction for hose connections with push-fit couplings ⇒ [page 198](#) .
- Align exhaust system free of stress ⇒ [page 239](#) .
- After replacing the diesel particle filter, an adaption must be performed in the function "Targeted functions" ⇒ Vehicle diagnostic tester.



1.5 Replacing middle or rear part of the exhaust system

Special tools and workshop equipment required

- ◆ Body saw , e.g. -V.A.G 1523 A - or chain pipe cutter , e.g. - VAS 6254-
- ◆ Protective goggles

Work procedure

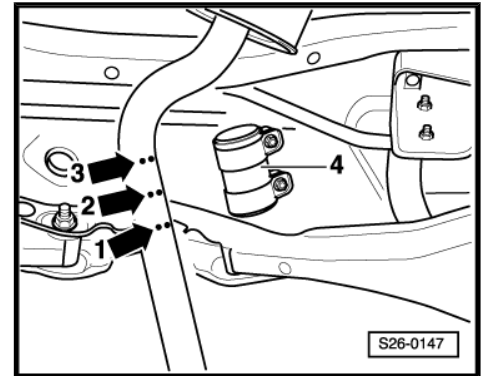
- ◆ For separating the middle or rear silencer, a separation point is provided in the connecting pipe, which is marked with a recess.



WARNING

To avoid injury from metal shavings, wear eye protection and protective clothing.

- Separate exhaust pipe with body saw at right angles at the separation point -arrow 2-.
- When installing, position rear clamping sleeve -4- at the side markings -arrow 1- and -arrow 3-.
- Turn the rear clamping sleeve -4- in such a way that the ends of the screws are as far upwards as possible.
- Align rear part of exhaust system horizontally and tighten rear clamping sleeve to 23 Nm.
- Align exhaust system free of stress ➤ [page 239](#) .



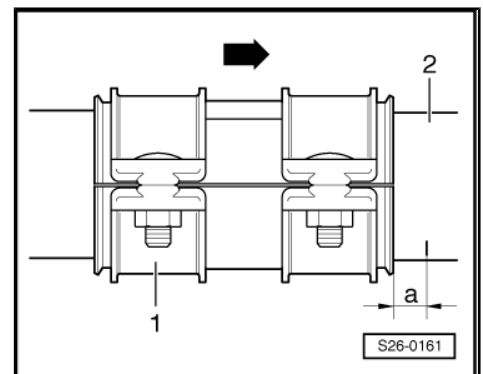
1.6 Align exhaust system free of stress

- The exhaust system is aligned when cold.
- Slacken front clamping sleeve -1- and align to catalytic converter -2- (-arrow- points in direction of travel).
- $a = 5 \text{ mm}$

The fixing screws must be located on the right. They must not protrude beyond the bottom edge of the double clamp.

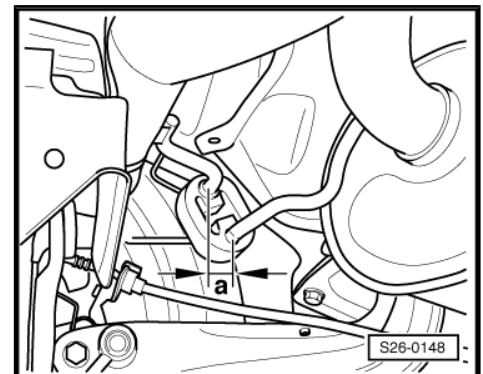
- Tighten front nut by hand.

Vehicles with front-wheel drive



- Push the exhaust system so far forward until the initial load on the rear retaining strap at the middle part of the exhaust system -a- = 9...11 mm.

Vehicles with four-wheel drive

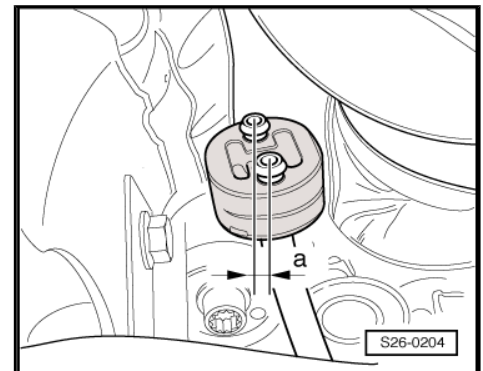


- Push the exhaust system so far forward until the initial load on the rear retaining strap at the middle part of the exhaust system -a- = 7...9 mm.

Continued for all vehicles

- Tighten the nuts of the front clamping sleeve evenly to 23 Nm.

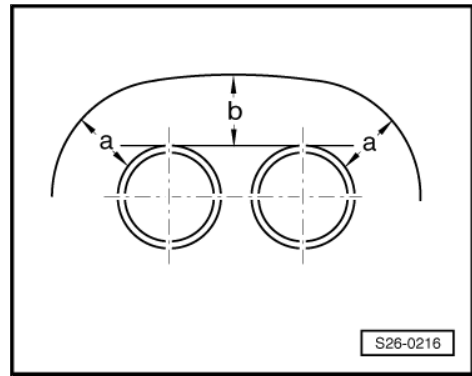
Align exhaust tailpipes





- Align rear part of exhaust system:
- There must be an equal distance -a- between bumper opening and exhaust tailpipe.
- The distance -b- from the bumper opening to the exhaust tailpipes is equal.

For aligning, loosen the hangers of the exhaust gas system.



1.7 Inspecting the exhaust system for leaks

- Start engine and run in idle.
- Seal off exhaust tailpipe for the duration of the leak check (e.g. with cloths or plugs).
- Inspect connection points of cylinder head/exhaust manifold, exhaust gas turbocharger/pre-exhaust pipe etc. for leak-tightness by listening.
- Eliminate any leak found.



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2 Exhaust gas recirculation system

2.1 Removing and installing exhaust gas recirculation system parts for engines with code BKD, AZV

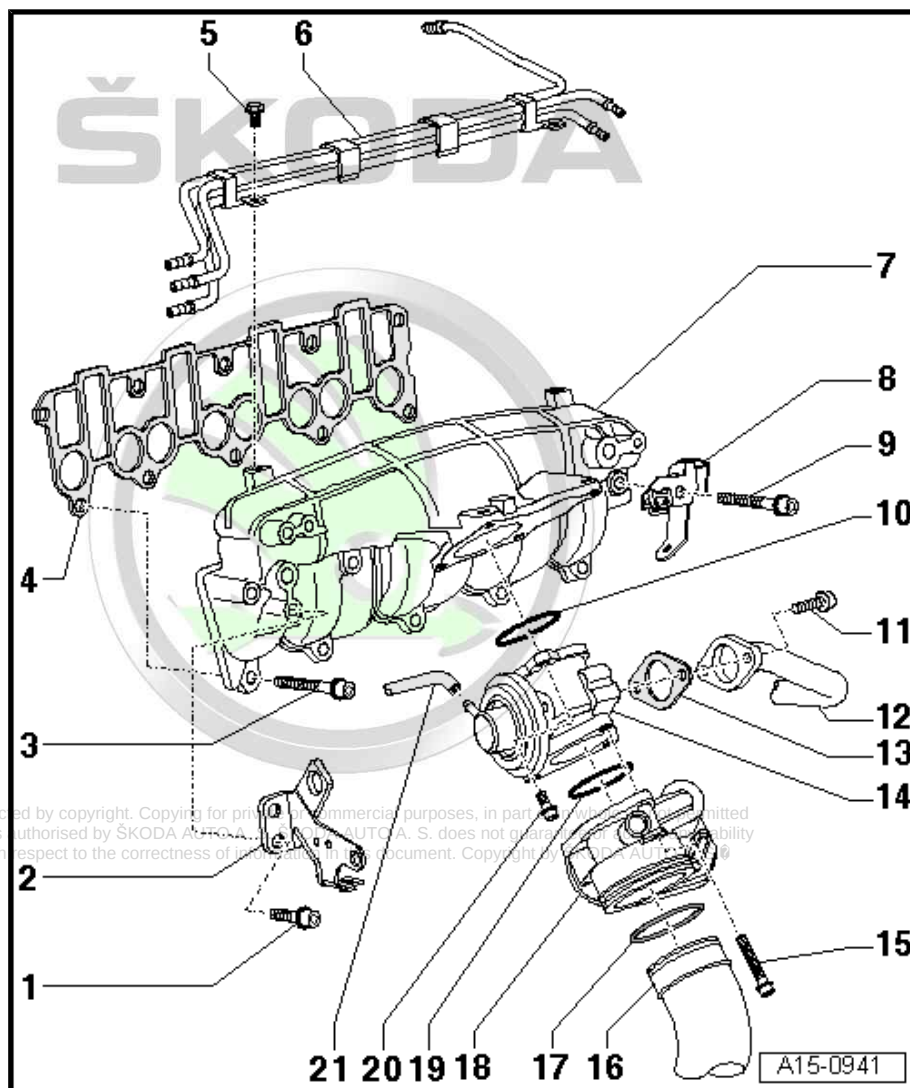


Note

- ◆ *The exhaust gas recirculation system is operated by the engine control unit - J248 - via the EGR valve - N18- integrated into the valve block for the mechanical exhaust gas recirculation valve.*
 - ◆ *The mechanical exhaust gas recirculation valve with cone-shaped valve plunger makes it possible to achieve different opening cross-sections at different opening strokes.*
 - ◆ *Any desired valve plunger position is possible as a result of the pulsed operation.*
 - ◆ *The exhaust gas recirculation switches off at idling speed after about two minutes.*
 - ◆ *When taking longer measurements, restart the engine or increase engine speed briefly to more than 1500 rpm. After this repeat the measurement.*
 - ◆ *Secure all hose connections with corresponding hose clips.*
 - ◆ *Replace self-locking nuts.*
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- 1 - 22 Nm
- 2 - Shackle
- 3 - 22 Nm
- 4 - Gasket
 - ☐ replace
- 5 - 10 Nm
- 6 - Pipes
 - ☐ for fuel and coolant
- 7 - Intake manifold
- 8 - Mounting bracket
 - ☐ for wiring loom
- 9 - 22 Nm
- 10 - O-ring
 - ☐ replace
- 11 - 22 Nm
- 12 - Connecting pipe
 - ☐ for exhaust gas recirculation
- 13 - Gasket
 - ☐ replace
- 14 - Mechanical exhaust gas recirculation valve
- 15 - 10 Nm
- 16 - Connecting hose
- 17 - Sealing ring
 - ☐ replace
- 18 - Intake manifold flap motor - V157-
 - ☐ The intake manifold flap is closed for about 3 seconds after switching off the engine and then opens again. This reduces the switch-off impact.
- 19 - O-ring
 - ☐ replace
- 20 - 10 Nm
- 21 - Vacuum hose
 - ☐ in the valve block

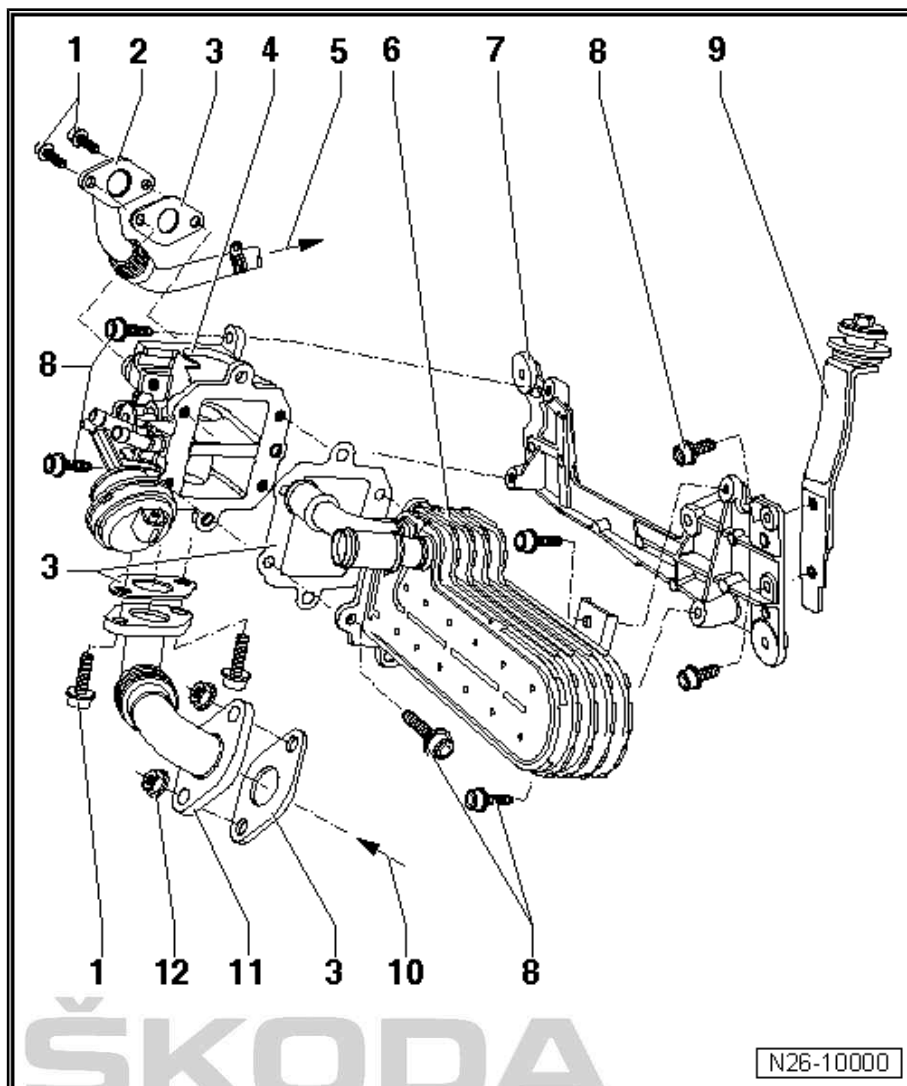


2.2 Summary of components - radiator for exhaust gas recirculation system for engines with code BKD, AZV

- ◆ Connection diagram for vacuum hoses ➔ [page 184](#)

- ◆ Connection diagram for valve block and vacuum sockets
⇒ [page 185](#)

- 1 - 22 Nm
2 - Connecting pipe
3 - Gasket
☐ replace
4 - Radiator flap for exhaust gas recirculation
☐ with vacuum actuator
☐ Check ⇒ [page 244](#)
☐ When activated, it carries the exhaust gas via the exhaust gas recirculation radiator
5 - to mechanical exhaust gas recirculation valve
☐ ⇒ [page 241](#) , Pos. 14
6 - Radiator for exhaust gas recirculation
☐ Removing and installing ⇒ [page 245](#)
7 - Mounting bracket
☐ for exhaust gas recirculation radiator flap and for exhaust gas recirculation radiator.
8 - 10 Nm
9 - Mounting bracket
☐ for engine cover
10 - from exhaust manifold
11 - Connecting pipe
12 - 25 Nm



2.3 Checking the mechanical exhaust gas recirculation valve for engines with code BKD, AZV

Special tools and workshop equipment required

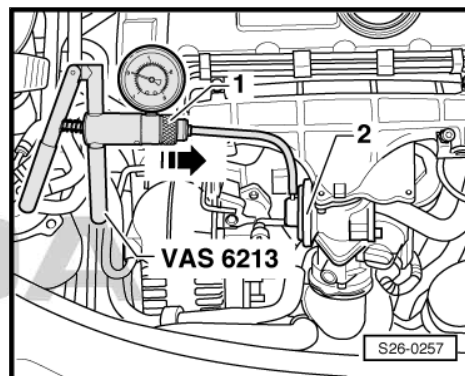
- ◆ Hand vacuum pump , e.g. -VAS 6213-

Test sequence

- Remove engine cover ⇒ [page 13](#) .



- Disconnect vacuum hose from mechanical exhaust gas recirculation valve -2-.
- Connect hand vacuum pump - VAS 6213- to valve.
- Slide the sliding ring -1- of the hand vacuum pump - VAS 6213- in the -direction of arrow- for "vacuum".
- Create vacuum.
- Detach hose of hand vacuum pump from exhaust gas recirculation valve.
- Closing of the valve should be clearly audible.



2.4 Function of the exhaust gas recirculation radiator

The exhaust gas recirculation system is fitted with a radiator through which the coolant flows, in order to improve the exhaust values.

The exhaust gas flowing back into the combustion chamber is conducted via this radiator under certain conditions. The exhaust gas temperature can therefore be reduced, which reduces the combustion chamber temperature and improves the exhaust gas values.

The exhaust gas recirculation radiator is switched on or off by the engine control unit via the exhaust gas recirculation radiator change-over valve - N345- . The electropneumatic change-over valve opens or closes the vacuum ports to the vacuum actuator of the radiator flap.

2.5 Checking the change-over for exhaust gas recirculation radiator for engines with code BKD, AZV

Special tools and workshop equipment required

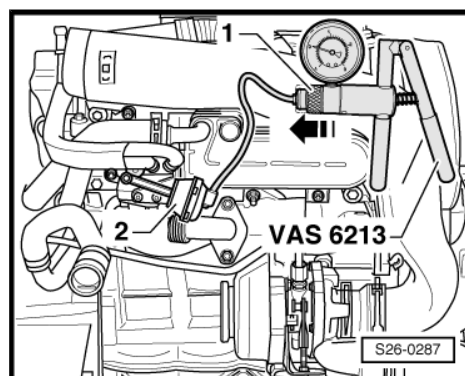
- ◆ Hand vacuum pump , e.g. -VAS 6213 -

Test sequence

- Detach the vacuum hose from vacuum actuator -2- of the exhaust gas recirculation radiator flap.
- Connect the hand vacuum pump - VAS 6213- to the vacuum actuator.
- Slide the sliding ring -1- of the hand vacuum pump - VAS 6213- in the -direction of arrow- for "vacuum".
- Create vacuum.
- The tension rod from the vacuum actuator of the exhaust gas recirculation radiator flap must move smoothly.

If the tension rod does not move or moves jerkily:

- ◆ Defective vacuum actuator
- ◆ Stiff exhaust gas recirculation radiator flap
- Replace the exhaust gas recirculation radiator flap
⇒ [page 245](#) .



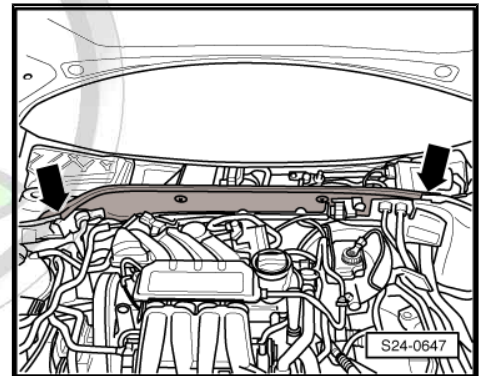
2.6 Removing and installing the radiator for exhaust gas recirculation for engines with code BKD, AZV

Special tools and workshop equipment required

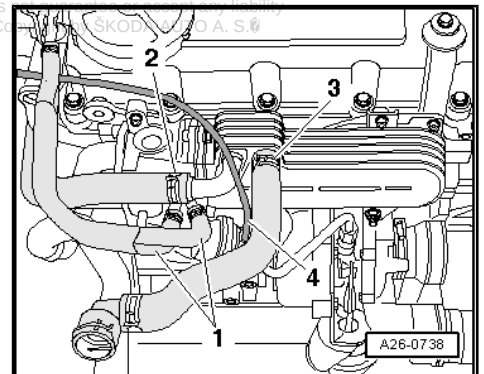
- ◆ Hose clamp - MP 7-602 (3094)-
- ◆ Pliers for spring-type clips

Removing

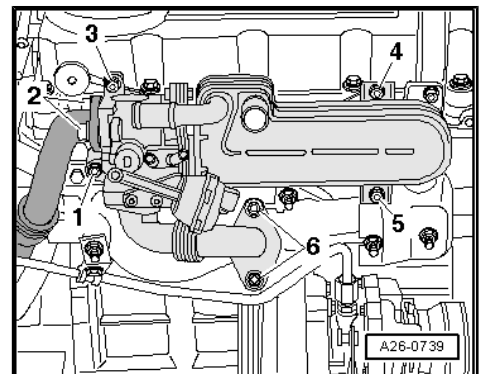
- Remove the cooling water tank cover ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove bulkhead plenum chamber -arrows-.
- Remove intake hose between air filter and exhaust gas turbo-charger ⇒ [page 208](#) .



- Clamp coolant hoses on the flap housing of the exhaust gas recirculation radiator and on the exhaust gas recirculation radiator using hose clamp - MP 7-602- .
- Disconnect coolant hoses -1- from flap housing of the exhaust gas recirculation radiator.
- Disconnect coolant hoses -2- and -3- from exhaust gas recirculation radiator.
- Detach vacuum hose -4- from vacuum actuator of the exhaust gas recirculation radiator flap.



- Remove screws -2- and -6-.
- Unscrew screws -1, 3, 4, 5- and remove exhaust gas recirculation radiator.



Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Note

- ◆ *Replace the gaskets, the sealing rings and the self-locking nuts.*
- ◆ *Secure all hose connections with corresponding hose clips.*
- Top up coolant ⇒ [page 135](#) .



2.7 Removing and installing the exhaust gas recirculation system for engines with code BMM



Note

- ◆ The exhaust gas recirculation system is controlled by the diesel direct injection system control unit -J248- to the electrical exhaust gas recirculation valve - N18- with potentiometer for exhaust gas recirculation - G212- and actuator for exhaust gas recirculation - V338- .
- ◆ The mechanical exhaust gas recirculation valve with cone-shaped valve plunger makes it possible to achieve different opening cross-sections at different opening strokes.
- ◆ Replace self-locking nuts.

1 - Gasket

- ☐ replace

2 - Intake manifold

3 - Sealing ring

- ☐ replace

4 - Supports

5 - Intake manifold flap motor - V157-

- ☐ The intake manifold flap is closed for about 3 seconds after switching off the engine and then opens again. This reduces the switch-off impact.

6 - from charge-air cooler

7 - 10 Nm

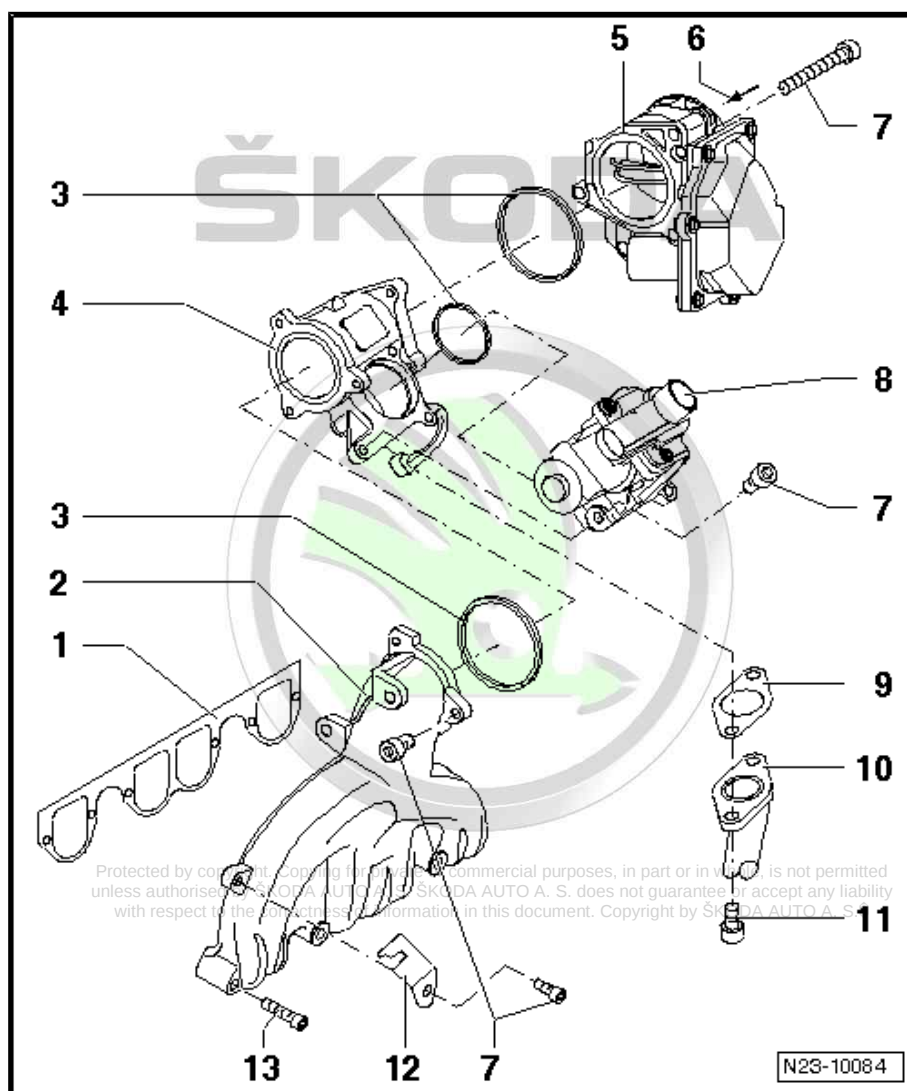
8 - Electric exhaust gas recirculation valve - N18- with EGR potentiometer - G212- and EGR control motor - V338-

- ☐ before installing, check sealing surfaces at intake manifold for dirt and clean as required
- ☐ After replacing, adapt new part as follows:
 - Switch ignition on and off; then wait 1 minute for the afterrun of the control units.
 - Start engine and run in idle for at least 1 minute.

- Interrogate the fault memory ⇒ Vehicle diagnostic tester.

- There must be no faults stored in the fault memory.

- If a fault is stored, clear fault memory and repeat the entire procedure.



N23-10084

9 - Gasket

- ☐ replace

10 - Radiator

- ☐ for exhaust gas recirculation

11 - 22 Nm

12 - Mounting bracket

13 - 22 Nm

2.8 Summary of components - radiator for exhaust gas recirculation system for engines with code BMM

1 - Coolant hose

- ☐ to connection fitting
- ☐ Connection diagram for coolant hoses
⇒ [page 129](#)

2 - Gasket

- ☐ replace

3 - 22 Nm

4 - Connecting pipe

5 - From exhaust manifold

6 - 25 Nm

- ☐ replace

7 - to connector of exhaust gas recirculation valve - N18-

8 - Radiator for exhaust gas recirculation

- ☐ Removing and installing
⇒ [page 248](#)

9 - 10 Nm

10 - Coolant hose

- ☐ from the coolant pipe at the rear
- ☐ Connection diagram for coolant hoses
⇒ [page 129](#)

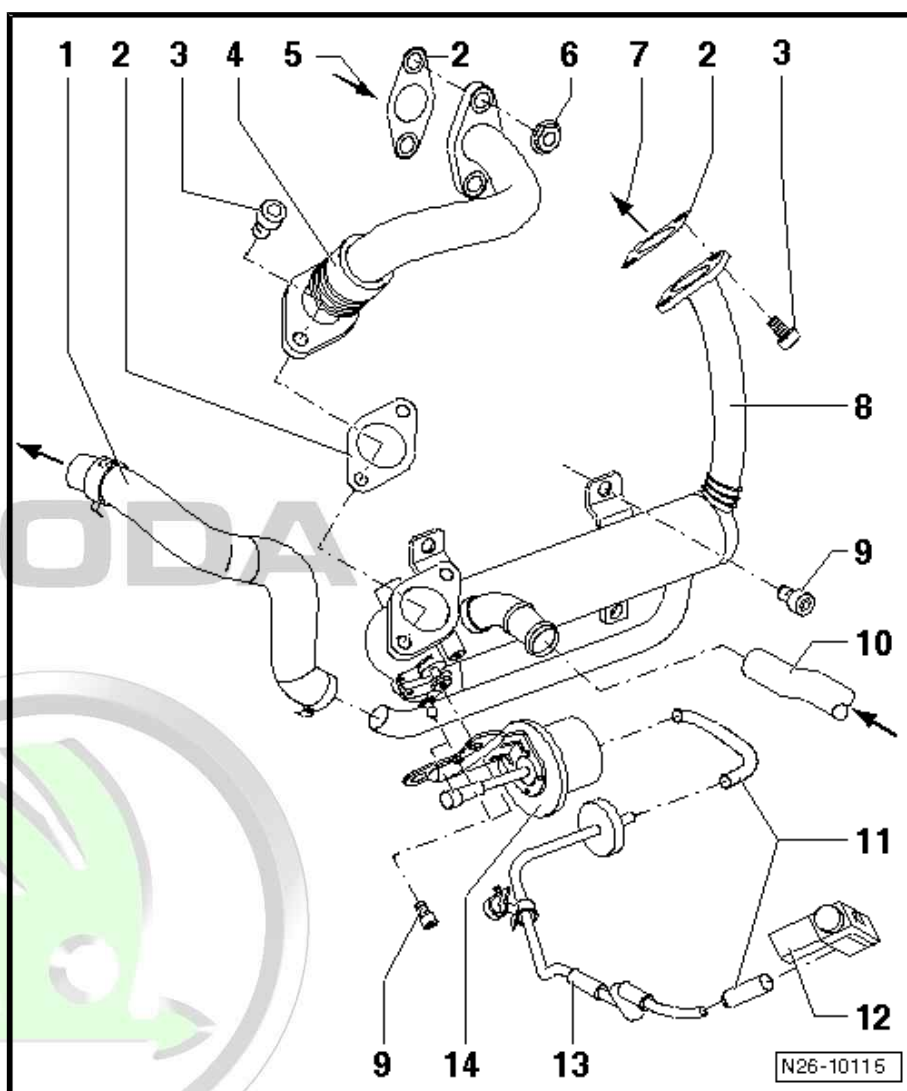
11 - Connecting hose

12 - Changeover valve for radiator of exhaust gas recirculation - N345-

13 - Connecting pipe

14 - Vacuum setting element

- ☐ the radiator flap for exhaust gas recirculation
- ☐ always replace together with radiator for exhaust gas recirculation
- ☐ Check ⇒ [page 248](#)
- ☐ Connection diagram ⇒ [page 249](#)



2.9 Checking the change-over for exhaust gas recirculation radiator for engines with code BMM

Special tools and workshop equipment required

- ♦ Hand vacuum pump - VAS 6213-

Work procedure



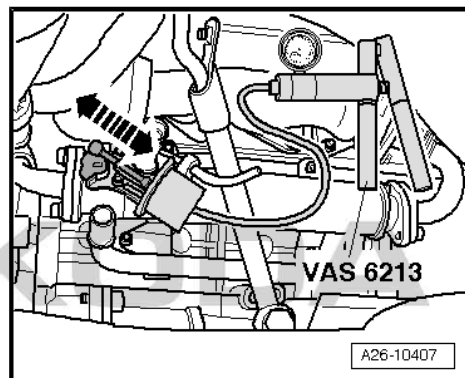
Note

The vacuum setting element for change-over flap is accessible from below.

- Detach the vacuum hose from the vacuum unit.
- Connect the hand vacuum pump to the vacuum unit.
- Operate hand vacuum pump.
- The change-over linkage for the exhaust gas recirculation radiator must move -arrows-.

If the linkage does not move or only moves with a sudden motion:

- ♦ vacuum unit is defective.
- ♦ Change-over flap for radiator of exhaust gas recirculation is sluggish.
- Replace radiator for exhaust gas recirculation ⇒ [page 248](#).



2.10 Removing and installing the exhaust gas recirculation radiator for engines with code BMM

Special tools and workshop equipment required

- ♦ Catch pan for workshop cranes , e.g. -VAS 6208-
- ♦ Pliers for spring-type clips

- Remove pre-exhaust pipe with diesel particle filter ⇒ [page 234](#).
- Drain coolant ⇒ [page 143](#).

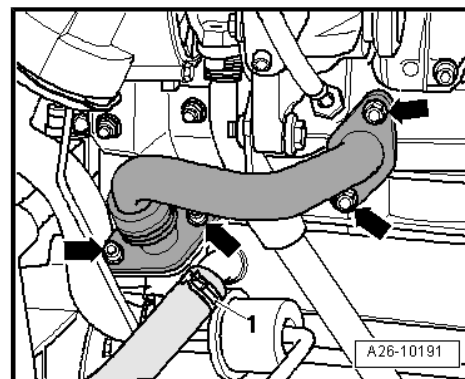
Vehicles with four-wheel drive

- Remove the right flange shaft of the angle gearbox ⇒ Gearbox ⇒ Rep. gr. 39.

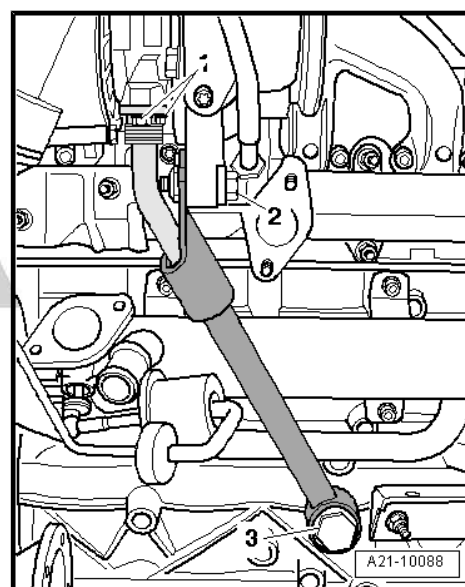
Continued for all vehicles

- Place a catch pan under the engine.
- Detach coolant hoses from radiator for exhaust gas recirculation.

- Unscrew connection pipe for exhaust gas recirculation radiator -arrows-.



- Unscrew screw -2- and hollow screw -3-.
- Rotate the turbocharger support 90° and pull it down and out of the oil return line.



- Unbolt bracket -2- for diesel particle filter.
- Disconnect the vacuum line -1- and remove.
- Release screws -arrows- and remove radiator for exhaust gas recirculation.

Installing

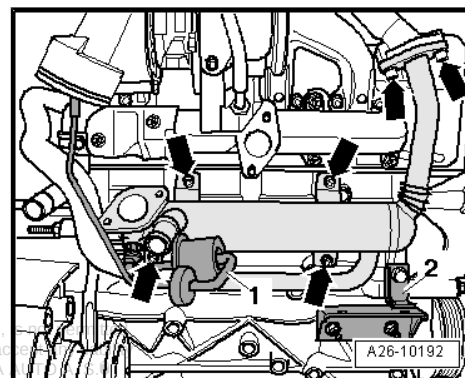
Installation occurs in reverse order to removal. Pay attention to the following:



Note

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- ◆ *Replace the gaskets and the self-locking nuts.*
- ◆ *Secure all hose connections with corresponding hose clips.*



2.11 Connection diagram for exhaust recirculation vacuum hoses for engines with code BMM

Summary of components ➔ [page 186](#)



28 – Glow plug system

1 Glow Plug System

1.1 Removing and installing the glow plugs for engines with code BKD, AZV

Special tools and workshop equipment required

- ◆ Insertion tool 8 mm

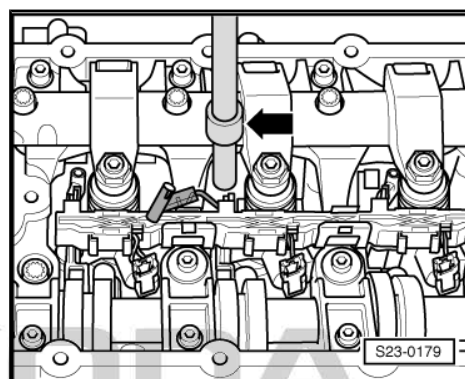
Removing

- Switch off ignition.
- Remove cylinder head cover ➔ [page 72](#) .
- Unplug connector from glow plugs.
- Remove glow plugs using plug insert -arrow-.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Install glow plugs and tighten to 10 Nm.
- Install cylinder head cover ➔ [page 72](#) .



1.2 Checking the glow plugs for engines with code BKD, AZV

Glow plugs can be checked in “guided fault finding” with the vehicle diagnosis, measurement and information system - VAS 5051- .

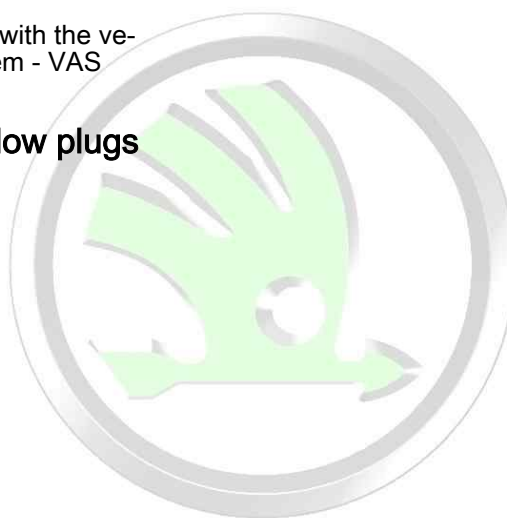
1.3 Removing and installing the glow plugs for engines with code BMM

Special tools and workshop equipment required

- ◆ Flexible-head wrench e.g. -3220 -

Removing

- Switch off ignition.
- Remove engine cover ➔ [page 13](#) .



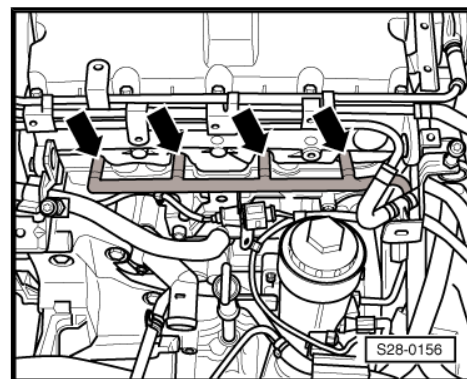
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- Unplug connector of the glow plugs -arrows-.
- Remove the glow plugs using a flexible-head wrench e.g. -3220- .

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Install glow plugs and tighten to 15 Nm.



1.4 Checking the glow plugs for engines with code BMM

Special tools and workshop equipment required

- ◆ Handheld multimeter - V.A.G 1526 B-

Test conditions

- Ignition off.

Test sequence

- Unplug connector of the glow plugs.
- Connect handheld multimeter - V.A.G 1526 B- for resistance measurement between contact and glow plug housing.
- Specified resistance value: less than 1Ω

If the resistance value is exceeded (greater than 1 Ω), then the glow plug is defective.

- Replace defective glow plug ⇒ [page 250](#) .
- Check glow plugs in all cylinders one after the other.
- Reconnect removed connectors for glow plugs.